THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXIV. No. 601.] LONDON, NOVEMBER 17, 1874. [26th Year.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. Ramsay, Newcastle-on-Tyne.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
STEVENS AND CO.,
London Office, 21, Great Winchester Street, E.C.

PROUD'S
SPECIALITIES IN WOOD
FOR
PURIFIERS & SCRUBBERS
MADE FROM THE BEST QUALITY
OF
WELL-SEASONED PLANKS.
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST,
BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
Quay Side, Newcastle-on-Tyne.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL AND CO.,
THE OLD TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
Warehouses:
60, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE, } LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanised Tubes and High-Pressure Tubes, &c.
Lists may be obtained on application to
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JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Agent—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

SCOTTISH CANNEL COAL.
J. & W. ROMANS,
GAS ENGINEERS AND COAL FACTORS,
OF
EDINBURGH and LONDON,
CONTRACT FOR SUPPLYING ANY QUANTITY OF
GAS, HOUSE, and STEAM COAL, and CANNEL;
Also for every sort of Gas Apparatus and Fire Goods.
Messrs. Romans, being lessees of Wilsontoun-Works, have their Cannels tested in the ordinary working process, thus securing for their customers a guarantee beyond mere laboratory experiments.
Analysis, prices, and other information will be forwarded on application to their Offices, 39, St. Andrew Square Edinburgh; and 1, Walbrook, Mansion House, London.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
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GEORGE GLOVER & CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
236, GEORGE STREET, GLASGOW; and 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

CAFFALL, THOMAS, & CO., LIMITED.

PATENT IMPROVED SEAL

FOR

GAS HYDRAULIC MAINS.

SAVES COAL, RETORTS, FUEL, LABOUR, TIME, SPACE, AND CAPITAL.

PREVENTS STOPPAGE OF ASCENSION-PIPES, DEPOSITION OF CARBON IN RETORTS, THICKENING OF TAR IN HYDRAULIC MAIN.

GIVES MORE GAS PER TON OF COAL, WITH HIGHER ILLUMINATING POWER, SATISFACTION, AND PROFIT TO SHAREHOLDERS AND MANAGERS.

IS STRONG, SIMPLE, EASILY FIXED AND WORKED, AND THOROUGHLY EFFICIENT AT ALL TIMES.

TESTIMONIAL.

Gas-Works, Guildford, Sept. 15, 1874.

GENTLEMEN,—The five retorts fitted with your Patent Moveable Seal for Dip-Pipes, on June 30, have been in constant use since that date, and have worked in a most satisfactory manner.

These Retorts are still quite clean and free from carbon, whilst others not so fitted, after being at work eight weeks, required scurfing, having a deposit of carbon 2 inches in thickness on the inside.

I also find a slight increase in the yield of gas per ton of coal carbonized, although your Patent Seals are fitted to but one-fifth of the Retorts now at work.

As your statements respecting your apparatus are fully confirmed by the results obtained in practical working, I should wish you at once to fix one to each of the ovens at these works, that I may obtain all possible advantage during the coming winter.

Yours truly,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street, E.C. JOS. SHAW, Manager.

MODELS MAY BE SEEN, AND INFORMATION OBTAINED, AT THE OFFICES, 28, GRACECHURCH STREET.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

London Agent: W. G. DAVIS, 2, BRABANT COURT, PHILPOT LANE, E.C

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS,

OLD HILL, near DUDLEY,

MANUFACTURERS OF

HOWARD'S PATENT IMPROVED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

Also **ORDINARY WELDED WROUGHT-IRON TUBES and FITTINGS,**

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS FOR IRONFOUNDERS, STOCKS, TAPS, AND DIES, IRON COCKS, &c.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

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Drawings and Prices upon application.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

INVERKEITHING,

(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his CELEBRATED HALBEATH STEAM COALS, on Navy List.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

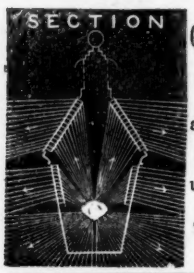
Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.



THE PATENT

CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

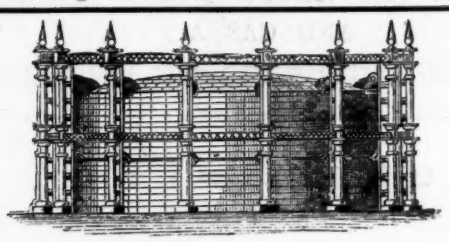
NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B—Estimates for all Gas Plant and Remodelling supplied on application.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,

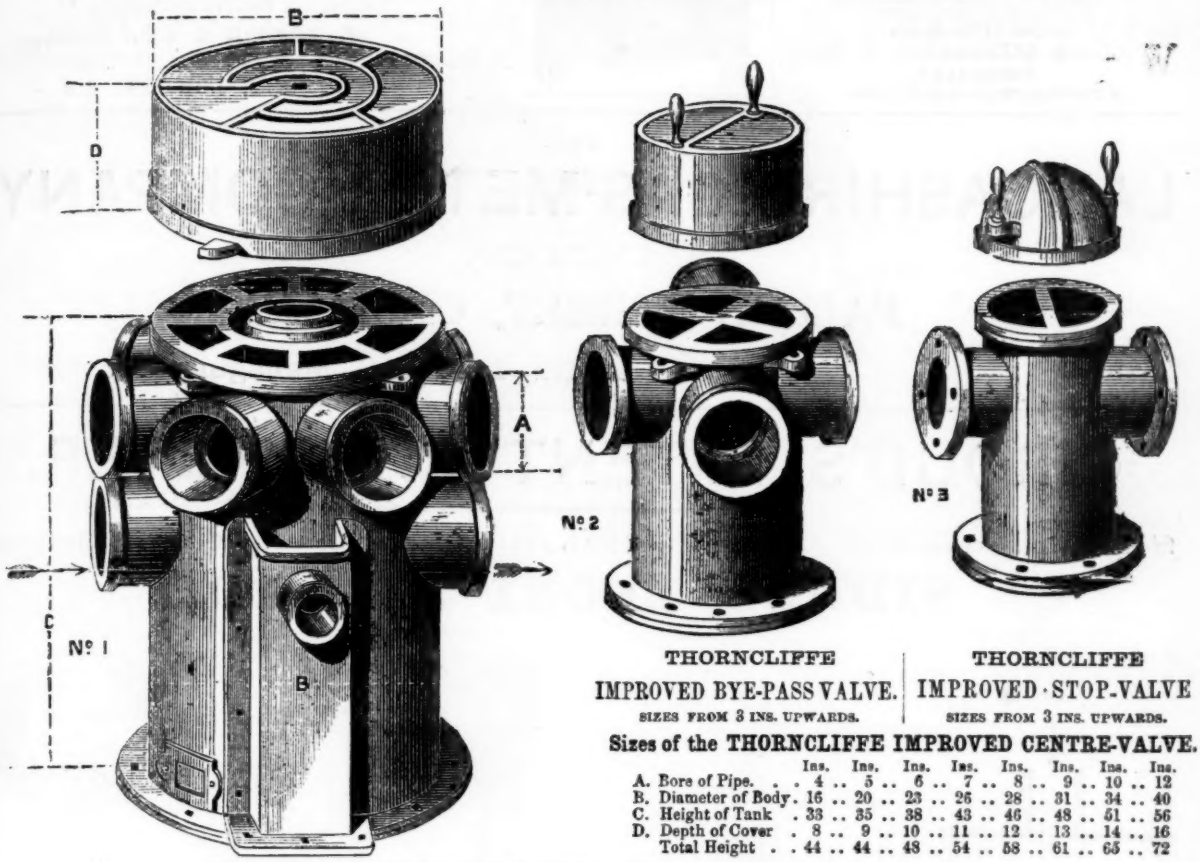
Has all the appearance of a Bright Fire.

PRICE from 32s.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

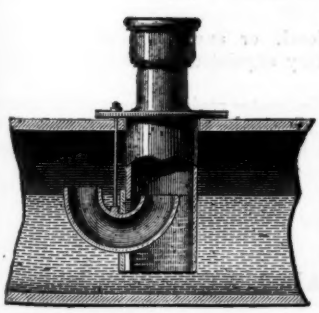
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

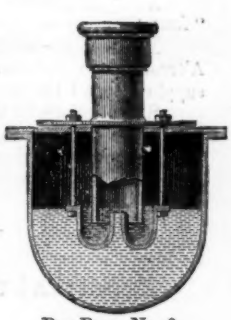
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

Messrs. NEWTON, CHAMBERS, & CO., Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

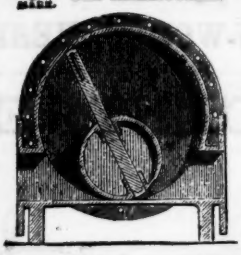
J. G. HAWKINS, NEEPSEND GAS-WORKS, SHEFFIELD.

J. T. B. PORTER & CO.,
GAS ENGINEERS & CONTRACTORS,
LINCOLN,
AND 1, WESTMINSTER CHAMBERS, LONDON, S.W.

Estimates for Works of any Size.
References to 500 Works already Erected.

INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

TRADE MARK
J. BEALE'S
PATENT
GAS EXHAUSTER.



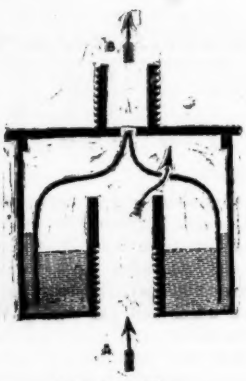
BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.
Estimates and Prices on application to
B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

THE
LANCASHIRE GAS-METER COMPANY,
LIMITED,
FALCON STREET, OLDHAM.
HENRY THOMAS, Managing Director.

GIROUD'S PATENT RHEOMETER.

Sole Licensees and Agents for the United Kingdom of Great Britain,
SIDNEY LEONI AND CO.



Sectional View.

Glycerine neither evaporates nor freezes at ordinary degrees of temperature.

Inside a Lamp.

Under a Globe Burner.

The RHEOMETER is a new apparatus of measurement; it is entirely made of "metal," and works "inside a closed vessel."
It determines the quantity of gas to be consumed; and this quantity remains unchangeable, whichever be the burner employed, and whatever be the pressure.

ADVANTAGES.

For Domestic Purposes.—Saving of Gas.—Possibility of adopting low-pressure burners, which give as much as "four times more light" than the others, with the same volume.

For Gas-Works.—It is no longer necessary to consider any differences of level, or any variations in pressure. Alterations in burners, or a change of burners, will not affect the consumption. The quantity stipulated by contract is always supplied to all the lamps.
Subscriptions by the hour are no longer a matter of difficulty; in such cases the "sealed" Rheometer replaces the ordinary meter.

For Town Lighting.—The Rheometer is a guarantee that the contract for lighting is duly carried out. Thus, good burners may be adopted, and the lighting thereby improved, without the gas company having any interest in intervening to oppose such a measure.

All Orders should mention what quantity per hour the Rheometer is intended to regulate.

Depot: At the ECONOMIC GAS STOVE COMPANY, 74, STRAND, ADELPHI, W.C.,
WHERE THEY MAY BE SEEN IN ACTION.

Adamas Works: 54 to 66, ST. PAUL ST., NEW NORTH ROAD, N. Offices: 19, GT. GEORGE ST., WESTMINSTER, S.W.

One Sample Rheometer sent Carriage Paid to any part of the Kingdom on receipt of 5s. in Stamps.

☞ PLEASE ADDRESS ORDERS TO THE WORKS.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

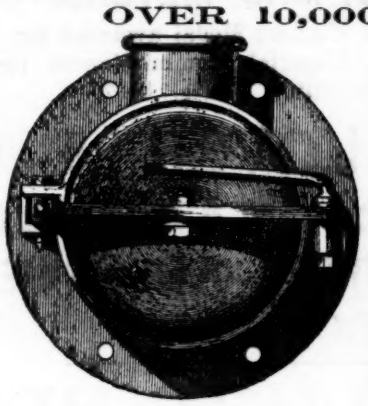
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

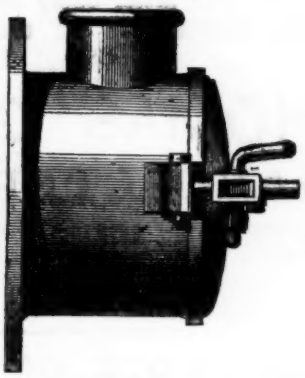
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
„ Gaslight Company, Bow Common.	„ Imperial Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ Merthyr Tydfil Gas-Works.
„ London Gaslight Company.	„ Gas-Works, Arsenal, Woolwich.	„ Liverpool United Gas-Works.	„ Ystrad Gas-Works.
„ Independent Gaslight Company.	„ Commercial Gas Company.	„ Birkenhead Gas-Works.	„ St. Alban's Gas-Works.
„ Phœnix Gaslight Company.	„ Alliance and Dublin Gas-Works.	„ Birmingham Gas-Works.	„ Over Darwen Gas-Works.
„ South Metropolitan Gaslight Co.	„ Edinburgh Gas-Works.	„ Nottingham Gas-Works.	„ Aylesbury Gas-Works.
	„ Manchester Corporatn. Gas-Works.	„ Newcastle-on-Tyne Gas-Works.	„ Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial has been given:—

THE GASLIGHT AND COKE COMPANY

(Commonly called the Chartered Gas Company),

MESSRS. TANGYE BROTHERS AND HOLMAN. *Beckton, North Woolwich, July 2, 1874.*

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

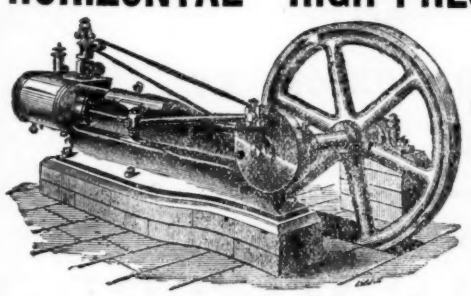
I am, yours truly,

(Signed) G. C. TREWBY.

P.S.—We shall have very shortly about 3000 of your Lids in use.

TANGYE'S

HORIZONTAL HIGH-PRESSURE EXPANSIVE STEAM-ENGINES,



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FOR

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BY THE

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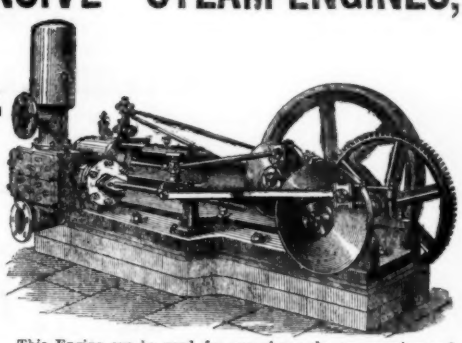
VIENNA, 1873.



PRICES OF ENGINES.

Size.	Nominal H. P.	Diameter of Cylinder.	Length of Stroke.	Price of Engine.	Feed Pump extra.	Variable Expansion extra.
		in.	in.	£ s.	£ s.	£
B	2	4	8	32 0	3 0	—
C	3	5	10	38 15	3 15	—
D	4	6	12	46 0	4 0	10
E	6	8	16	70 0	5 10	12
G	8	9	18	90 0	6 0	13
H	10	10	20	115 0	7 10	14
J	12	12	24	145 0	8 0	15
K	18	14	28	185 0	10 0	16

Over 1200 Sold since introduction in December, 1869.

PRICES of BOILERS on APPLICATION.

This Engine can be used for pumping only, or pumping and driving other Machinery simultaneously; or, by the sliding of a single pinion, the Engine can be disengaged from the Pump, and the former employed exclusively for other purposes.

PRICES OF ENGINES,

COMBINED WITH HOLMAN'S DOUBLE-ACTION PUMP.

Size. Nominal H. P.	C 3	D 4	E 6	G 8	H 10	J 12
	£	£	£	£	£	£
Engine and 3in. Pump	62	—	—	—	—	—
Do. and 4in. do.	68	80	—	—	—	—
Do. and 5in. do.	—	88	112	—	—	—
Do. and 6in. do.	—	94	117	135	160	195
Do. and 7in. do.	—	—	124	145	172	205
Do. and 8in. do.	—	—	135	160	185	215
Do. and 10in. do.	—	—	—	—	205	245

These Engines are adopted in Gas-Works at Haggerston (Independent Gas Company), Nine Elms (London Gas Company), Falmouth, Harrow, Jersey, Plymouth, Richmond, Rochdale, Santiago (Chili), &c.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

CONTENTS.

Circular to Gas Companies:— PAGE
The Interview of the Municipal Reform Association with the President of the Board of Trade . . . 661
Letter from the Board of Trade to the Association . . . 661
The Birmingham Gas Bills . . . 662
Gas Affairs at Keighley . . . 662
Water and Sanitary Notes:—
Water Affairs at Newcastle and Gateshead . . . 662
Indignation Meeting at Dudley . . . 662
Town Meeting at Manchester . . . 662
Sewage Treatment at Barnsley and Abingdon . . . 663
Leading Articles:—
Gas Legislation in 1874 . . . 663
A Treatise on the Science and Practice of the Manufacture and Distribution of Coal Gas . . . 664
Correspondence:—
Gas Purification . . . 666
Subjects Deferred . . . 666
Gas Affairs at Burnley and Rochdale . . . 667
The Test-Acid Query . . . 667
Legal Intelligence:—
Court of Chancery—
Bower *v.* Foreign and Colonial Gas Company, Limited, and Others . . . 667
The Attorney-General *v.* The Corporation of Birmingham . . . 668
The Attorney-General *v.* The Corporation of Barnsley . . . 668
In re the Eupion Gas and Fuel Company, Limited . . . 668
In re the St. Petersburg and Viborg Gas Company, Limited . . . 668
Court of Queen's Bench—The Edgware Highway Board *v.* The Harrow District Gas Company . . . 670
Mansion House Police Court—Eupion Gas Shares . . . 670
Miscellaneous News:—
Richmond Water Supply . . . 666
Serious Accident at Port Glasgow Gas-Works . . . 666
Gasholder Explosion near Barrow-in-Furness . . . 666
Fatal Accident at the Surrey Consumers Gas-Works . . . 667
Meeting of the Continental Union Gas Company . . . 670
Metropolis Gas Supply . . . 672
Metropolis Water Supply . . . 673
Testimonial to Mr. John Young . . . 673
Presentation to Mr. M. H. Loam, of Nottingham . . . 673
Institution of Civil Engineers . . . 673
Liverpool Gas Supply . . . 673
Wolverhampton Water Supply . . . 674
Bolton Corporation Water-Works . . . 674
Meeting of the Brighton Gaslight and Coke Company . . . 674
Suction-Pipe for Tar-Pump . . . 674
American Water Gas Researches. By Professors Würtz and Silliman . . . 675
Iron and Coal Trades of Sheffield, South Yorkshire, and North Derbyshire . . . 677
Iron and Coal Trades of South Staffordshire and East Worcestershire . . . 677
Iron and Coal Trades of Lancashire . . . 677
Coal and General Trade of the North . . . 677
Kettering Gas Company . . . 678
Gas Explosion on Shipboard . . . 678
Romford Gas and Coke Company . . . 678
The Sewage Difficulty at West Ham . . . 678
The Sanitary Condition of the Port of London . . . 678
Notes and Queries . . . 678

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 17, 1874.

Circular to Gas Companies.

We remarked last week that the proceedings taken by the Metropolitan Board of Works had brought us face to face with that body on the gas question. We may observe to-day that the letter of Mr. Farrer, published in another column, places us in a similar position with regard to the Board of Trade. It might, perhaps, be safer to say with regard to Mr. Farrer, but as Sir Charles Adderley must necessarily, on such a question as this, be dependent on the advice of some one who knows something about it, we may grant that, up to a certain point, Mr. Farrer is entitled to speak for his chief and for the Government.

The deputation, headed by Mr. Beal, whose interview with the President of the Board of Trade brought out this letter, went to Sir Charles Adderley to persuade him to take a definite course of action. It would almost seem that some recent utterances, and a still more portentous silence, had led the Municipal Reform Association to a belief that a metropolitan municipality is not likely to be a thing of to-morrow. Wishing, however, to anticipate the action of a metropolitan corporation on the question, they urged on the Board of Trade that policy of amalgamation which we have often said would facilitate the transfer of the undertakings, if ever a municipality should be formed. They see plainly enough, as all sensible people do, that the competition proposed by the Board of Works and Corporation of London would prove costly to the consumer if it were permitted. They, therefore, propose such uniformity of legislation as we suggested in our last, with enforced amalgamation, either complete for the whole metropolis, or so far partial as to provide for the constitution of one company on each side of the Thames. In this way, they very sensibly urged, the cost of administration would be reduced, and uniformity of price ensured. Pausing for a moment to thank Mr. Beal for reminding us that gas agitation since 1857 has cost the metropolitan ratepayers about the sum of £135,000, we may pass to the consideration of Mr. Farrer's letter.

The writer starts with the assertion that the history of past legislation is not favourable to any attempt on the part of the Government to enforce amalgamation among the companies, or to reduce the price of gas. The history of past legislation tells us nothing about the policy of *enforcing* amalgamation, for it has never been attempted. What has resulted from legislation? Encouragement of amalgamation, we all know. It is obvious, says Mr. Farrer, that the legislation of 1868, and of subsequent years, has not produced satisfaction. There is some truth in this. The Act of 1868, which was received with so much jubilation in the City of London, came, in the course of a few years, to be looked on with some disfavour. The Gas Committee of the Corporation, who must have some *raison d'être*, and must, in some way or other, earn their dinners, or pretend to do so, found a grievance in the action taken by the gas referees as regards the test burner and the sulphur question, and have kept up a continual agitation on these matters. As regards the districts outside the City, no one would pretend that the legislation of 1869 had had any other than a beneficial effect until the coal famine occurred. Mr. Farrer might have perceived that all the dissatisfaction now exhibited is not the consequence of legislation, but is caused mainly by the state of the coal market. But for that, the Phœnix and Imperial Companies would still be supplying gas at 3s. 6d. or less, and the Chartered at 3s. 9d.; and nothing but the silly agitation kept up in the City, for the love of turtle soup, would now be heard of. The idea, then, that the dissatisfaction is caused by legislation is erroneous; it has been caused by dear coal and mild winters, which, to the blessing of many, have kept down the price of coke. Let us for a moment digress, and fancy a succession of bad harvests all over the world, following soon after the repeal of the corn laws. Are there any who would suppose that the steps taken by the Legislature to cheapen bread had caused a rise in the price of that necessary of life? The intentions of the Legislature in 1868-69 were excellent; but they were thwarted by what we must call the natural laws of trade, as the intention of corn law reformers might have been by a famine.

We wish to see present dissatisfaction with the legislation of 1868-69 assigned to its true cause. The origin is dear gas, the grievance is that some gas companies are not obliged to sell gas without profit. Of course, the people who make all this noise would have called out the military to shoot down a starving mob, who wanted to compel bakers to sell bread without profit.

We pass on to the remarks on the districting of the companies. We do not know what official position Mr. Farrer held in 1859-60. If at the Board of Trade, he must know that the map, signed by Mr. Sotheron Estcourt, was settled after a most careful study by the companies, who looked after each other's interests. It might have been easy for a *doctrinaire* surveyor or engineer to cut up the map of London into geometrical patterns, and assign each district so made to a company; but that would not have squared with the then existing conditions. The great object of the districting was to leave each company, as far as possible, in possession of the ground they had secured, and that was accomplished, at what cost we very well know. We freely grant that, from one point of view, the districting is faulty; but who is to blame? Not the companies, who freely gave and took, when not a voice was raised against them. The Corporation of London were silent, and so were the Metropolitan Board of Works. We need not waste our space in explaining some of the apparent eccentricities of the arrangements. The conditions to-day, at the end of 1874, are very different from what they were in 1859. Even at that date the works of the Chartered Company were overcrowded, and incapable of extension. Popular opinion was opposed to fresh works in the metropolis, and the company were actually driven from their limits for a site for works rendered necessary by a natural extension of trade. They fixed upon Beckton—the best and cheapest situation they could find; and this necessitated their driving their principal main through the limits of another company. What has since happened in the case of the Imperial Company? They endeavoured to procure a site within their own limits; but the agitation started by a well-intentioned but weak-minded clergyman deprived them of the site near Victoria Park, and has driven them to Plaistow, which again necessitates the driving of their leading main through another company's district. Mr. Farrer might have remembered these facts before he brought, by implication, a charge against certain of the gas companies.

Then comes the main gist of the letter—the advice to the companies to amalgamate: "It is said that two companies, through "whose districts the very large main of another company passes, "are about to apply for an increase of capital to create a new "source of supply above this very main." The identification of these companies cannot be doubtful, and it is said that the Commercial and the Ratcliff have resolved upon amalgamation. That is all very well, but Mr. Farrer advises a much more extensive amalgamation—an amalgamation such as we have before recommended in these columns. One company north of, and another south of, the Thames, could well supply the gas wants of the

metropolis, with a great reduction of working expenses. If we look at Mr. Field's figures (quoted here for obvious reasons), what do we see? The working expenses of the Chartered Company, heavily weighted as they now are, amount to only 11s. 11d. per ton of coal carbonized; the working expenses of the Imperial Company are only 11s. 3½d. per ton of coal; but the expenses of the comparatively small Commercial Company rise to nearly 15s. 7d. per ton, and, in the case of the still smaller Ratcliff, actually amount to 16s. 1½d. per ton. The advocates of amalgamation will look no further for an argument in support of their views.

Mr. Farrer professes to believe the purchase of the companies by a municipality as imminent, and, as we did long ago, recommends amalgamation as a preliminary stage. But as neither the writer of this letter, nor we, nor Sir Charles Adderley, probably, is in possession of the secrets of the Cabinet, and know nothing of the intentions of the Government, we, on our part, only recommend amalgamation for the companies own sakes, and when we say that, we have in our mind the fact that the companies and the consumers interests are identical.

The next suggestion is somewhat remarkable. It is that companies should raise money by borrowing rather than by the issue of new capital. What financial economists will say to this we do not know, but, to our minds, no greater encouragement to extravagance could be given than by its adoption. Shareholders can exercise a certain control over a company's affairs, but mere money-lenders can do nothing of the sort. Hitherto, and we think with good reason, borrowed money has always been allowed in a certain proportion to paid-up capital. Mr. Farrer practically advises gas companies wanting money to apply for unlimited borrowing powers. But what will Lord Redesdale say to this? The Board of Trade is something, but Lord Redesdale is more, and what will his lordship say to an unopposed Bill simply asking for borrowing powers? We hope he would at once reject it. The question opened up here is, however, a large one, and we could not fully discuss it now. All we need say is, that there are very many men in the City of London who would rejoice to have the management of companies existing entirely on borrowed capital.

From this point we travel along very comfortably with Mr. Farrer. Given, perfect reciprocity of interest between the company and the consumer, he urges, as we have often done, that the former ought not to be tied down to a limited dividend. As regards the terms of a possible purchase of the undertakings, they are so fixed that there is no necessity for the companies to state them; and, thanking the writer for his frankness, we may perform the needless task of commending his letter to the attention of the gas companies.

Before quitting the subject, however, we may hazard the conjecture that the communication will not be made without some results, the earliest of which, we surmise, will be the amalgamation of the two largest companies. The consequences this union will involve need not, for the present, be alluded to.

We have suggested what the effect of this letter may be on some companies. What the result of its receipt by the Metropolitan Board of Works and the Corporation may be, we do not know. It contains a tolerably clear intimation that the Board of Trade will not give their support to either of the measures of the local authorities, unless that for the purchase of the companies be seriously pushed. The competitive scheme, so elaborately and expensively prepared, is certain to find no favour at Whitehall, and we are satisfied that the Board would gladly shirk the additional labour that would be thrown upon the department by a regulation Act. Altogether, we are inclined to think that the game is now in the hands of the companies, if their play be only up to the mark.

A plentiful crop of Bills, relating to gas affairs, has sprung up in Birmingham. The Corporation of course promote a Bill, the simple object of which is to enable them to effect the purchase of the companies on the terms already agreed upon, with power to carry on the undertakings, to levy rates, and borrow money. When the Corporation have acquired the undertakings, the Bill proposes to give them power to transfer, by sale or otherwise, any part or parts to sanitary or other local authorities. This provision is intended to disarm the opposition of outlying districts now supplied by the Birmingham and Staffordshire Company. Then we have notice of a Bill, promoted by the Birmingham and Staffordshire Gas Company, which provides for the transfer of their undertaking to the Corporation, and then proposes to give to the Corporation all necessary powers for borrowing money and levying rates. In the event, however, of this part of the Bill being rejected, the company will ask for additional capital on their own account. The (Old) Birmingham Company are prolific with two Bills. One is to authorize the sale of their undertaking to the Corporation, or, the arrangement falling through, to enable the company to raise further capital, and purchase much additional land for the improvement and extension of their works. The second Bill of the same company provides for the sale of their undertaking to the Staffordshire Company, or the purchase of the last named by the old company, or the amalgamation of the two undertakings. As we shall have occasion to notice these Bills at greater length after they are deposited, we now only give their most important points. To an "untutored savage" it must seem most extraordinary that, a simple arrangement, made and agreed upon, should involve all this fuss and expense to carry out; but common sense does not yet prevail in parliamentary practice or in parliamentary committees, and doubtless all is necessary and unavoidable.

The ratepayers of Keighley have had another meeting. They met this time in a temperance hall, and not in the public market-place, and the *genius loci* may have had something to do in moderating the tone of the proceedings. At all events, the ratepayers, after listening to the report of an "investigating" committee, appointed at the noisy meeting before referred to, came to the unanimous conclusion that their gas manager was a most efficient officer, and the conduct of the Gas Committee of the Local Board unimpeachable. And after that they went home in peace.

Water and Sanitary Notes.

The Town Council of Newcastle are still dissatisfied with the water supply. They now want immediate steps taken for the separation of the water pumped from the Tyne (which is to be reserved for manufacturing purposes) from the supply for domestic use, which they require to be furnished from the gravitation works. The arrangement, if carried out, will necessitate the laying of a double set of mains, and involve the company in great expense. The object is, of course, to drive the company from the Tyne, and compel them to extend their gathering-ground. It would seem, however, that a powerful engine is being put higher up the Tyne, which is to pump water into a reservoir, where it may be stored for six weeks, in which time, it is hoped, the peaty stain which suggests impurity may be lost. Ultimately the company must go to more extensive grounds, or cease to exist, and it might have been better if they had fallen in with popular views at once. Gateshead is still occupied with Mr. Newall's Ulleswater scheme, about which little is said in Newcastle. The projector is still of opinion that his open aqueduct, 70 or 80 miles long, can be made for £500,000, but he estimates the total cost of the scheme at £1,500,000; while there are people in Newcastle who believe it would be at least 2½ millions. It will be three years before the scheme can be carried out, and if in the meantime rain be plentiful, the people will have forgotten the present drought, and will be groaning over the expenditure. The supply at Morpeth is improving, but there is still a great scarcity of water at Wallsend.

An "indignation" meeting was last week held at Dudley, to protest against the quality of the water supplied by the South Staffordshire Water-Works Company. The medical officer attended, and brought with him some bottles containing what is described "as thick, oily-looking fluids of various shades of "green," which he averred had passed through the mains of the company, and plainly suggested that these fluids were fair specimens of the water usually supplied by the company. We need say nothing more about the doctor. A report by Dr. Hill, of Birmingham, to the town-clerk of Dudley, was afterwards read, in which it was stated that the green vegetable growth submitted for examination was a "confervoid alga," the mention of which innocent little vegetable sent a shudder through the meeting, and raised cries of "Oh!" Dr. Hill went on to say that the growth was useful in water rather than harmful; nevertheless, we are glad to learn that the company had removed the cause of complaint before the meeting was held, and that henceforth no inhabitant of Dudley will be frightened by the apparition of a "confervoid alga" in his drinking water.

To the unutterable disgust of Sir Joseph Heron, a town meeting, under the Municipal Corporations (Borough Funds) Act, has been held in Manchester. There was but a sparse attendance, from which Sir Joseph concluded that the burgesses considered the Act mentioned a piece of stupid folly. In that he may be altogether wrong. We know very well that the majority of Manchester people have confidence in the Corporation, and others imagine, probably, that they could spend their time more profitably in making money, which will enable them to pay rates, than in attending meetings to protest against rates. The fact is, no doubt, that the Manchester ratepayers feel, as we do, that the objects proposed by the Corporation in their present application are good and reasonable, and therefore they did not oppose. A day may, however, arise when the ratepayers and the Corporation will be at issue, and inasmuch as we believe in the principle of constitutional appeals to the people, we strongly advocate ratepayers to insist on the continuation of

the Municipal Corporations (Borough Funds) Act, which gives them a certain control over the expenditure of their Corporation.

Intermittent downward filtration seems to be rising in popular estimation. The Town Council of Barnsley have rejected a proposal for the treatment of their sewage by a precipitation plan, and have resolved on adopting the above-named system. Abingdon has also provisionally adopted the system.

GAS LEGISLATION, 1874.

The number of Acts passed to authorize the transfer of gas undertakings to local authorities was six.

The *Belfast Corporation Gas Act* authorized the purchase of the Belfast Gaslight Company by the Corporation of that borough, the "vesting day" being June 30 of the present year. The capital of the company was £200,000. The consideration money to be paid is £386,550, the Corporation assuming the mortgage debt of the company, leaving the reserve-fund to the company, and allowing £3000 out of general assets for the expenses of winding up. To effect the purchase the Corporation are empowered to raise, either by mortgage of the undertaking or the creation of annuities, the sum of £500,000. The purchase-money may also be raised by the creation of debenture stock, in which case the debentures are not to be issued below par, nor at a higher rate of interest than 4½ per cent. If the purchase-money was not fully paid on the vesting day (we believe it was), it was to carry interest at the rate of 4½ per cent. up to the date of June 30, 1876, and from that day onwards 5 per cent. The police-rates are included as an additional security. As the transfer has, we believe, been completed, we need only notice the obligations imposed on the Corporation. They are to supply 16-candle gas at a price not exceeding 5s. 6d. per 1000 feet, with the discounts previously allowed by the company. Only in the event of the price not exceeding 3s. 9d. can surplus profits be applied to public purposes. The illuminating power of the gas is to be tested by the new "London" burner, No. 1, with chimney according to circumstances, and gas is to be delivered at a pressure of not less than 7-10ths or 1 inch, within the usual hours. It is provided, however, that "sufficient notice" of the time and place of testing be given to the Corporation.

The *Neath Corporation Gas Act* empowers that Corporation to acquire the undertaking of the Neath New Gas Company. The capital of the company is, we rather think, £17,130, and the consideration to be paid by the Corporation is £33,000, with £289 18s. 6d. for moveable plant and stock. The purchase is to be completed on March 31, 1875; and if the consideration money be not paid on or before that day, it is to bear interest at the rate of 7 per cent., and the company are to remain in possession, but are not to incur any extraordinary expenses without the consent of the Corporation. The Corporation are to supply 14-candle gas, as tested by the new "London" Argand, and the price is not to exceed 5s. 6d. per 1000 feet. Surplus profits may be applied to public purposes. The Corporation have power to borrow £20,000, in addition to the sum required for the purchase.

The *Nottingham Corporation Gas Act* authorizes the purchase of the Nottingham Gaslight and Coke Company, the consideration being an annuity in respect of every fully-paid share in the company of £3 2s. 6d. for the period of seven years, from 1874 to 1881, and thenceforward an annuity of £3 5s. The Corporation assume the mortgage debt of the company. Power is given for the purchase of the annuities by the Corporation, at the market price, by agreement with the annuitants, and the Corporation may at their option hold or extinguish such annuities. Authority is also given to the Corporation to borrow from time to time such money as they may think fit for the execution of this Act, the security being the undertaking and the borough rate and borough fund. As regards the application of surplus profits, it is provided that the Corporation may apply to public purposes the sum of £5000 annually; but any surplus beyond this must remain credited to the gas account, and be applied towards reduction of price.

The *Westleigh, Pennington, and Bedford (Lancashire) Local Boards Gas Act* authorizes the joint purchase by those Boards of the Leigh District Gas Company, the consideration money being £48,000. The three Boards are to contribute equally to the purchase-money. If the purchase was not completed within a month from the passing of this Act, 5 per cent. was to be paid on the purchase-money. To provide the consideration money and carry on the business each of the three Local Boards has power to borrow £25,000, which they are given 58 years to pay off. The concern is to be managed by a joint committee of the three Boards, whose proceedings are to be controlled by a standing arbitrator appointed by the Boards, or by the Local Government Board, if these do not agree in their selection. Fourteen-candle gas is to be supplied at the maximum price of 6s. per 1000 feet. The pressure is to be 6-10ths and 8-10ths within the usual hours.

The *Ulverston Local Board Act* authorizes the Board to purchase the undertaking of the Ulverston Gas Company. The consideration, we may say shortly, is annuities equal to maximum dividends—10 per cent. and 7 per cent. Power is given to the Board to redeem the annuities by agreement. Fourteen-candle gas is to be supplied, and it is to be tested by an Argand 15-hole burner, with 7-inch chimney, or other burner approved by the Local Government Board. No maximum price is fixed by this Act, so it is to remain the same as fixed by the Ulverston Gas Act, 1864. The Local Board assume the debts of the company, which are very small; and the Act makes a special provision for Jacob Royston, an old and now infirm servant of the company, who is to occupy for the remainder of his life the house he now lives in, free of rent, &c., and to have £1 a week for performing such voluntary work as his age will allow. The Ulverston Local Board are evidently a body of liberal gentlemen.

The *Wigan Improvement Act* empowers the Corporation to acquire the undertaking of the Wigan Gas Company, the consideration being the payment of £130,228 2s. 6d. The sale includes the reserve-fund of the company *minus* any sum which may be required, in addition to actual profits, to pay maximum dividends for the first half of this year. The purchase-money was to be paid on October 1, and in default the Corporation are to pay interest at the rate of 4½ per cent. As regards price, illuminating power, &c., the provisions of the Wigan Gas Act, 1861, are continued. For gas purposes, the Corporation are granted power to borrow immediately £140,000, and, with the sanction of the Local Government Board, a further sum not exceeding £50,000.

The *Middlesborough Extension and Improvement Act* does not fit into our usual classification. It extends the limits of the borough, and transfers the gas undertaking from the Local Board to the urban sanitary authority for "the advantage of the borough, and "the inhabitants thereof," the Act says.

Four corporations and three gas companies obtained Provisional Orders under the Gas and Water Works Facilities Act Amendment Act, 1873, raising the maximum price of gas. These orders were subsequently confirmed by an Act 37 & 38 Vict., cap. 17. The Burnley Corporation were empowered to raise the price from 3s. to 3s. 8d. per 1000 for two years. The Corporation of Glasgow were authorized to charge 6s. instead of 4s. 7d. for the same period. The Paisley Corporation obtained power to increase the price of gas from 4s. 2d. to 6s., and the Southport Corporation were granted authority to raise the price from 4s. to 4s. 3d. per 1000 feet, and reduce the illuminating power from 20 to 18 candles.

The companies which obtained orders are as follows:—

The *Cork Gas Company*, who obtained power to charge 5s. 3d. and 5s. 9d., instead of 4s. 9s. and 5s. 3d., within and without certain limits. They were at the same time authorized to charge £4s. 8s. 6d. instead of £4 per public lamp; but, while they make these charges, they are bound not to divide more than 5 per cent. on their ordinary capital.

The *Weymouth Gas Consumers Company* obtained power to raise the price of gas from 4s. 6d. to 5s. 3d. per 1000 feet, and at the same time were limited provisionally to a dividend of 4½ per cent.

The *Wrexham Gas Company* have been authorized to add 8d. per 1000 to the price of gas, and are tied down to a dividend of 3¾ per cent. It is hardly necessary to say that all these orders remain in force only two years, after which period companies and corporations have to fall back on their original prices.

Eleven gas companies availed themselves of the Gas and Water Works Facilities Act, 1870, and obtained Provisional Orders, which were confirmed by the Act 37 & 38 Vict., cap. 87.

The *Braintree and Bocking Gas Company* obtained power to raise their capital from £12,000 to £20,000, the dividend on the additional £8000 being limited as usual. The company are to supply 14-candle gas at a price not exceeding 6s. 5d. per 1000.

The *Brough, Elloughton, and Welton Gaslight and Coke Company* are empowered to increase their share capital from £3500 to £6000, and they have the unusual privilege of paying 8 per cent. on the additional capital if raised by ordinary shares. They need supply only 12-candle gas, and the price is not to exceed 7s. 6d. per 1000. The gas is to be tested by the new "London" burner, and should the flame tail over the chimney, &c., &c.

The *Chelmsford Gas Company* are authorized to raise their share capital from £22,325 to £32,325, the dividends on the additional £10,000 being limited as usual. Fourteen-candle gas is to be supplied, and the price is not to exceed 5s. 10d. per 1000 feet.

The *Dartford Gas Company* obtain no power to increase their capital, and simply procure powers to construct and maintain

new works. They are to supply 14-candle gas at the price fixed by the Dartford Gas Act, 1867.

The Guildford Gas Order extends the limits of the *Guildford Gaslight and Coke Company*, and authorizes them to raise £30,000 additional capital, carrying the usual borrowing power. The dividends on this capital are limited as usual to 7 per cent. or 6 per cent., according as the shares are ordinary or preference. Fourteen-candle gas is to be supplied, and the price is not to exceed 6s. 6d. within two miles of the works, nor 7s. beyond that distance.

The *Harwich Gas Order* authorizes the Harwich Gas Company to increase their capital from £12,000 to £24,000, with the usual limits of dividend on the additional. They are to supply 14-candle gas at a price not exceeding 7s. 1d. (!) per 1000 feet.

The *Lofthouse and District Order* authorizes a new company to raise £15,000, the dividend on which is, of course, only limited by the general Acts. Fourteen-candle gas is to be supplied at a maximum price of 7s. per 1000 feet.

The *Retford Gas Order* empowers the Retford Gas and Coke Company, apparently a new company, to raise £12,000 for gas-works. They are to supply 14-candle gas at a price not exceeding 6s. per 1000 feet.

The *Romford Gas Order* authorizes the Romford Gas and Coke Company, with an original capital of £14,000, to raise £3000 addition, the dividend on which latter is limited as usual. Fourteen-candle gas is to be supplied, and the price is not to exceed 6s. 4d. within a mile of the works, or 7s. beyond that radius.

The *Sidmouth Gas Order* authorizes Mr. John Dunning to invest £15,000 in the gas undertaking, and requires him to supply 14-candle gas at a maximum price of 8s. 4d. per 1000 feet. The advantage of an order in such a case as this is, of course, to fix and secure the limits of supply.

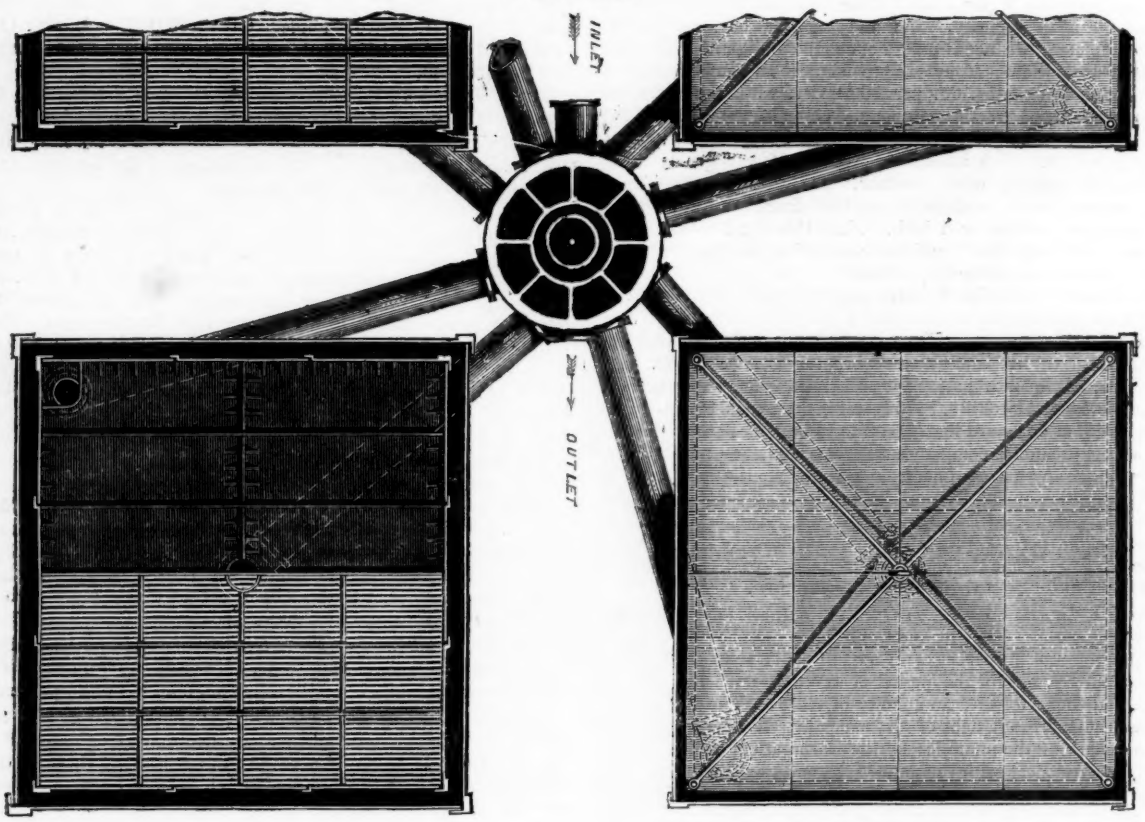
The *Sutton-in-Ashfield Gas Order* authorizes the gas company in the place now, with a capital of £10,000, to raise an additional £10,000; dividends to be limited as usual. Fourteen-candle gas is to be supplied, at prices not to exceed 6s. 6d. within a mile of the works, or 7s. 6d. beyond.

Our readers will understand that in all these orders the testing regulations of the Gas-Works Clauses Act, 1871, are incorporated, and also the clause of that Act which compels payment of interest on money deposited with the companies by way of security for payment of gas-rents.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXXIX.

PURIFIERS.

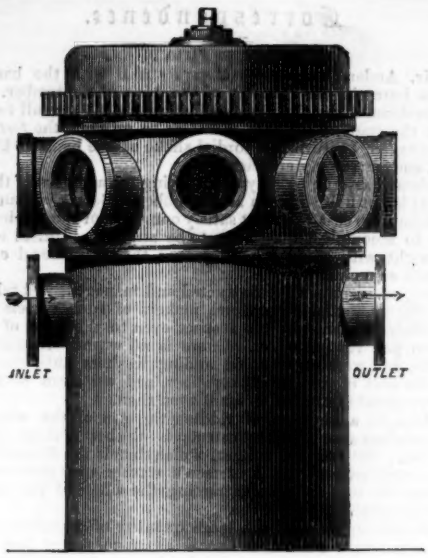


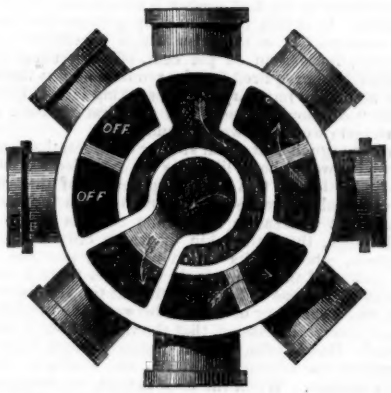
The above engraving represents a plan of John Malam's combination of purifiers and connexions, but, for economy of space, only parts of two of the vessels are shown. The hydraulic valve is, however, superseded by the dry rotary valve invented and patented by Messrs. Cockey, of Frome, in 1857, and, as will be observed by reference to the arrows, which indicate the course of the gas, all the passages to and from the respective purifiers, as well as the inlet and outlet, are precisely like those of Malam's, already described. The great merit of the invention consists in the production of an effective and superior valve without the aid of water. Probably the inventor adopted the idea from the dry-meter rotary valve, and it is singular, with the various kinds of rotary valves that had been in use, the hydraulic was not superseded earlier.

The first drawing on next page is an elevation of the valve as manufactured by Messrs. Cockey. The top is the cover, provided on its periphery with teeth, for the purpose of being actuated by a pinion, but, when of small dimensions, it may be turned by a handle. The cover is so adjusted to its seat as to be perfectly gas-tight, and as it is exposed directly to the atmosphere, any minute escape of gas would be readily detected.

In the seat of the valve, and in direct communication with the sockets which convey the gas to and from the purifiers, are eight divisions, and in the centre is the inlet, with the concentric outlet passages. The lower part of the apparatus serves as a "syphon," to collect the condensed liquor. The action is identical with that of the hydraulic valve; that is, by turning the cover the fourth of a circle, the purifiers are changed. The other figure is a sectional plan of the cover on its seat, showing the various divisions, which control the direction of the gas, together with the eight different passages of the seat communicating with the purifiers, the course of the gas being indicated by the arrows.

According to the more modern method of constructing Malam's combination, the concentric pipe was abandoned, and, instead thereof, the outlet was formed on the top of the cover, in that division which contained the outlet-pipe, its socket being placed at the side of the tank. In imitation of this, Messrs. Walker, of Donnington, simplified the central valve by enclosing the cover with a cast-iron case, to which is attached the outlet of the valve, and further reducing the divisions in the seat to nine instead of ten, by this means considerably diminishing its area. Further, according to the method of construction adopted by that firm, the "gratings" of the valve-seat are always covered by corresponding surface bars, which are attached to, and form part of, the cover; by this means any deposit upon the gratings is avoided. From the writer's expe-





rience, no difficulty arises from such deposit; but it may be assumed that Messrs. Walker have good and substantial reasons for making such addition, which, as we are informed, has been applied on the most extensive scale, and with every success. Some manufacturers have departed from the original method of constructing these valves, by making them with a conical seat, somewhat resembling an ordinary tap. We are unable to understand that any advantage is gained by the change; but, on the contrary, in our opinion, the conical valve possesses several drawbacks, for in it there are three different surfaces to adjust and make sound, instead of two, as in the other kind. The cover of the conical valve is more weighty, and by its form becomes to an extent wedged into its seat. To counteract this, and in order that the cover may be turned, a screw is required to relieve the weight; and this, in the hands of unskilful persons, is productive of considerable mischief, for, by the relieving-screw, the valve may be rendered unsound, and even useless, which defect cannot occur with the flat-surface valve. Besides, in all kinds of mechanical construction, the first consideration should be simplicity; the flat-surface is the simplest, and we believe as far superior to the conical-seated valve as the latter is to the old hydraulic.

The advantages attending the use of the dry valve are the absence of the foul liquor, which always existed in the hydraulic valve, and being constantly in contact with the purified gas, necessarily contaminated it in its passage; and the facility and rapidity with which the change is effected from one purifier to another, so as to prevent any sensible admixture of the foul with the pure gas, whilst its durability may be considered unlimited. On first placing these valves, their surfaces should be well smeared with tallow, when, according to our experience, they will remain perfectly sound, and will neither get bound nor set, even after many years active service.

By Malam's combination, alike in the hydraulic as in the dry valve, there exists this peculiarity, that by turning the cover only the eighth part of a circle, instead of a fourth as indicated, then either two or three purifiers can be thrown out of action, according to its position. This method, although sometimes applied, may lead to error; and undoubtedly the best plan is to arrange the apparatus so that three purifiers shall be always in action. By adopting this course, whenever the make of gas becomes diminished, either less purifying material may be used at each charge, or the purifiers changed less frequently, and for the strict observance of economy in the purifying agents, as well as for the proper purification of the gas, when the lime, oxide, &c., are estimated to be sufficiently saturated, the test-paper should be applied from time to time; and when this becomes slightly fouled at the fifth division of the purifiers (we suppose three of these to be in use, each of them subdivided, and provided with test-cocks), then the purifiers should be changed.

Formerly, when several valves were employed to work a set of purifiers, a great amount of trouble was often occasioned. Sometimes, by shutting the wrong valve, the purifiers would blow, when considerable confusion would arise, and amongst a number of valves there was sure to be one or other unsound. All this can now be avoided, for the arrangement with the central valve is not only the cheapest, but the best and most efficient, requiring less labour, and attended with infinitely less risk than any other. If the work can be done with one valve, without incurring any extra expense, we cannot see the wisdom of employing a plurality of them.

It now becomes a consideration to define the capacities of the purifiers and their connexions, and for this purpose the maximum production must be ascertained. In the construction of works for supplying a new locality or town, this can only be ascertained by investigation and study. Engineers sometimes calculate this from the estimated annual production; but unless all the circumstances of locality, nature of the town to be supplied, and the pursuits of the inhabitants, are taken into consideration, this method is fallacious, as the following observations will show:—

Firstly, there are large manufacturing towns where the demand for gas in the summer is remarkably limited, whilst in the winter months it is very considerable, requiring five times the number of retorts used in summer for the supply.

There are other towns which are not dependent on any class of industry, where the consumption during the several hours of lighting is tolerably uniform throughout the year, the increase or decrease being only due to the lengths of the nights. Again, there are others, as some of the towns in the tropics, where the daily consumption throughout the year is about alike; for instance, at Pará, the difference between the longest and the shortest days in the year is only about fifteen minutes, the sun always setting at about six o'clock in the evening, and rising about six o'clock in the morning, with merely the variation stated.

Lastly, there are towns where the public lights are lighted during the whole of the night, for five or six nights of each month only, and for a corresponding period are not lighted at all; under all these varying conditions, therefore, no approximation to correctness can be made without having a knowledge of the circumstances and conditions connected with the town to be supplied.

Some years ago, a popular writer constructed a table showing the number of hours in each month of the year, for public lighting between sunset and sunrise; but it is evident such a table would be applicable to a particular latitude only, for, without going farther, that which would be correct in London, would be incorrect at Edinburgh, as the daylight, during the depth of winter, is fully half an hour longer in the former than in the latter city, and, of course, the opposite in the summer time. The average difference between the longest and shortest days in the United Kingdom is about nine hours, and, as shown, in some towns it is but 15 minutes; with this great variation, therefore, no general table can be adopted.

The maximum production being determined, the general law observed is to apply a purifying area of one square yard for every thousand feet of gas produced per diem, and as it is always better to err on the safe side, and as gas-works once established are always increasing, we venture to suggest 10 feet area instead of 9 feet, as generally adopted; thus giving 7½ fect of active surface per 1000 feet maximum daily production. Thus, admitting this to be correct, the greatest daily make being 100,000 feet, the area of the grids would be 1000 feet superficial; and supposing four purifiers, of which three are in operation, it would represent 250 feet to each purifier, and these having each, say, four tiers of grids, would give a surface of 62½, say 64 feet to each grid, so that a purifier 8 feet square, internal measure, would be required. Local circumstances may require that the purifiers should be oblong instead of square; but, of course, the same law is applicable.

It is a general rule, which within certain limits may be adopted as correct, that the connexions of the purifiers should be of such dimensions, that their diameter in inches is equal to the square root of the area of one of the purifiers in feet. Thus the connexions for the purifiers above referred to should be 8 inches. This rule, however, is only applicable to connexions varying from 4 inches to 12 inches in diameter, for when they are made smaller, they are liable to be obstructed; on the other hand, as the delivery of gas is greatly inceased in proportion as the diameters are augmented, so for any increase in the size of connexions above 12 inches, a proportionate reduction in their dimensions may be allowed.

In explanation of this, let us take a pipe 12 inches in diameter of such a length, and having such pressure, that it will deliver, say, 15,000 feet of gas per hour. Let us take another pipe of 18 inches diameter, and adopting the 12-inch for basis, according to their respective areas, the 18-inch pipe, under the same conditions of length and pressure, should deliver somewhat less than 34,000 feet per hour; whereas, in practice, it delivers about 42,000 feet. Again, a pipe 24 inches in diameter, under like conditions, should only deliver 60,000 feet; but, in practice, it delivers 84,000 feet per hour.

Hence we find, by the augmented diameters of connexions, and their respective sectional areas, that the 18-inch delivers 25 per cent., and the 24-inch delivers 40 per cent. more gas than the 12-inch; and, under such varying conditions, it is impossible to apply any general rule or law.

However, we believe, for large purifiers, the proper method is to reverse the rule already given. Thus, the daily maximum production of gas being determined, the size of the pipe necessary for delivering that quantity should be ascertained from Mr. Barlow's table, originally published in this JOURNAL, and to be found in most modern works on gas lighting. Then, by allowing 7½ feet active area for the grids, which may be in either four, five, or six tiers, but always having an intervening space of not

less than 10 inches, the dimensions of the purifiers are ascertained. In some establishments six and even eight purifiers are in combination, but the rule suggested is equally applicable.

In addition to the superficial area of the grids, another point should be well considered; that is, the cubical contents of the purifiers, so that the gas in its transit may be in a state of comparative repose, and in the condition to yield more readily its impurities than if it is caused to pass rapidly through the apparatus; and undoubtedly it is one of the most important considerations in the purification of gas to have all the apparatus—as washers, scrubbers, or purifiers—of large cubical capacity, so that the gas may pass gradually, and have proper time for its impurities to be absorbed.

The thickness of the layers in the purifiers must depend on the nature of the material employed. The object of having several tiers of sieves is to avoid compression; thus, if a layer of lime 3 inches thick permits the gas to pass with sufficient freedom, by adding another like thickness, the lower stratum would be rendered so compact as to impede the passage of the gas. The same remarks apply to the oxide of iron, some of which is very variable in quality, having from 15 to 30 per cent. of oxide, the rest being earthy matter; in this case, as with the hydrate of lime, the layer would have to be limited, so as to avoid any undue pressure. Oxide of iron is supplied intermixed with sawdust, but for foreign works, where sawdust is to be had in the locality, the most economical system is to procure the peroxide of iron by itself and mix it with sawdust in the proportion of about 1 cwt. of the former to 5 or 6 bushels of the latter, which should be intimately intermixed and well moistened before being used. New material like that described, on becoming foul, is very liable to spontaneous combustion when exposed to the atmosphere, and to avoid this a portion of old material should be mixed with the fresh. In some parts of England manufacturers replace the saturated oxide of iron with fresh material, thus reducing the expenses of this part of gas manufacture to those of labour only.

In connexion with each of the purifiers, pressure-gauges should be placed in a conspicuous position, so that any obstruction from the purifying material will be readily detected. For any excess of pressure, from whatever cause it may arise, is so much extra labour thrown on the exhauster, and is equivalent to the waste of fuel necessary to counteract that pressure; but where the exhauster is not employed, the question becomes infinitely more important from the increased deposit of carbon on the retorts, and the loss by leakage.

The admixture of atmospheric air, even in a slight degree, is prejudicial to gas as an illuminating agent; therefore, when bringing a fresh purifier into action after being charged, it is necessary that the air therein should be expelled. Sometimes this is done in a very imperfect manner, by having a valve on the top of the cover; but, as this can only allow the air to pass from one of the divisions, it is, of course, useless for the other. To accomplish this in a proper manner there should be a valve of about one-sixth of the diameter of the connexions placed on the outlet of the central valve. This is opened in the act of changing the purifiers, and by the odour it can be ascertained when the air is expelled.

(To be continued.)

Richmond Water Supply.—Major Tullock, one of the inspectors of the Local Government Board, opened an inquiry on the 9th inst., at the Richmond Vestry Hall, in reference to the application by the select vestry of Richmond for permission to take steps to provide a new water supply for the town. The proceedings were of a purely formal nature, and Major Tullock adjourned the inquiry to an early day in December.

Serious Accident at Port Glasgow Gas-Works.—On Monday, Nov. 9, a serious accident happened at these works, which are at present in course of being enlarged. A number of men were employed taking down the old roof, between seven and eight in the morning, when it gave way sooner than was expected, and two of the workmen were severely crushed. A carter, whose horse was startled by the noise and ran off, also sustained serious injuries.

Gasholder Explosion near Barrow-in-Furness.—On Wednesday afternoon last, an alarming accident happened at Askam, by which one man was instantaneously killed and two others were very seriously injured, one of whom has since expired. About half-past three o'clock a gasholder, the property of the Barrow Corporation, was blown up. This gasholder had been erected near the junction between the main-line of the Furness Railway and the branch line leading to the iron-works of the Furness Iron and Steel Company. During the last eight months workmen have been engaged completing the erection of the holder, which was intended to supply the iron-works with gas from Barrow. For the last few weeks it has been filled and refilled with air to test its holding capacity. The tests having proved satisfactory, the process of filling it with gas was commenced on Wednesday, under the superintendence of Mr. Scott, from the Barrow Gas-Works, assisted by T. Harris, one of the workmen from the same place; John Pennington, of Askam, gas-fitter to the iron-works, and Henry Walker, a lad aged 18, residing at Askam. These men were all engaged on the top of the holder. Scott had returned, after telegraphing to Mr. Lewis at Barrow for a greater pressure of gas, and Pennington had been instructed to do nothing until the holder had been filled as indicated. The test-pipe led out from a tap at the top of the holder, and Pennington, having misunderstood his order, applied a light thereto. No sooner, however, was the light applied than Scott, on discovering that Pennington had disobeyed his orders, and hearing a rumbling noise, warned the men that disastrous results might be anticipated. A terrific explosion ensued, shattering the top of the holder, sending the heavy balance-weights to the ground, and blowing the men engaged upon the works into the air. Harris was thrown a considerable distance, and fell with his head on the rails of the Furness line, his skull being fractured, and death resulting instantaneously. Pennington also fell on the rails, sustaining severe injuries; and Scott, who alighted on the railway bank nearest to the holder, had his wrist-joint dislocated, his fingers lacerated, and his ankle and ribs injured. Dr. Hall, of Dalton, who passed the spot just after the accident, gave directions as to the disposal of the injured men. The body of Harris was removed to the Askam Hotel. Scott was sent off to Barrow in one of the conveyances belonging to the Furness Iron and Steel Company. Dr. Anderson, found that Pennington's skull was fractured, his thigh bone fractured, and that he had sustained other injuries. He never regained consciousness, and died on Thursday morning.

Correspondence.

GAS PURIFICATION.

Sir,—Mr. Anderson does not always strike with the bare fist, as witness his letter in the Journal of the 15th of September. On that occasion he donned the gloves; and though we felt the full force of his blows, yet the *suaviter in modo* went far to mitigate the *fortiter in re*. Thus encouraged, I return the cordial shake of the hand so kindly outstretched, and pursue my criticisms.

Mr. Anderson asserts, by way of justifying the adoption of the washer, that its cost is not half so much as a scrubber. Before we can decide as to the comparative cost, we must satisfy ourselves of the efficiency of the apparatus to accomplish the object to be attained. Unless we first do this, we might with equal relevancy aver that a washer does not cost half so much as a church.

Scrubbers, when properly constructed and managed, will take out the whole of the ammonia. There are makers of such vessels who will *guarantee* their efficiency in this respect even to the limit of less than half a grain per 100 cubic feet. There is no washer in existence that will do this, and were we to go on adding washers until the series far exceeded the cost of an efficient scrubber, and use clean water in each, I believe we should not accomplish it even then.

If it comes to a question of ridding the gas of the whole of the ammonia, washers as at present constructed—the best of them—will not do it at any cost. Viewed in this light, which then is the dearest? I quite admit the superiority of Mr. Anderson's washer over most others, but even against his, cost for cost, extracting the whole of the ammonia, I am prepared to back the scrubber.

Mr. Anderson infers from the large quantity of ammonia which one washer charged with weak ammoniacal liquor takes out, that if he had another charged with pure water to finish with, he would remove the remainder. I am not of that opinion. The extraction of the large quantity of ammonia by the first washer is no criterion at all of what the second would do. It is just this remaining portion that the washer is powerless to remove. It is this also which necessitates height in a scrubbing vessel; more than 50 per cent. of the vertical height of an efficient scrubber being required for the removal of less than 4 per cent. of the whole ammonia impurity. This striking fact is clearly demonstrated in the "Ammonia Report" of the first referees, a document which gas managers would do well to study.

It may here be argued that, from similar considerations, an extension of washer capacity would be as likely as an extended scrubber capacity to effect the elimination of this remaining portion of the impurity; but there is this essential difference in principle between the washer and the scrubber—viz., that whereas in the former the gas passes through in globules or bubbles, the outer skin of which only is affected by the washing medium, which in its action positively provides a means of escape for a portion of the ammonia, in the latter there is continual disintegration both of the gas and water, without the slightest tendency to form bubbles, and a certainty of contact between the particles of each.

I would here observe, in passing, that the vessel of Mr. Paddon, erected at the Portslade Gas-Works,* is an ingenious and fairly successful attempt to combine the advantages of the scrubber with the moderate altitude of the washer. When the most is made of the revolving discs or screens (which at present is not the case), this modification of the apparatus may become the rival of the vertical scrubber.

I am of opinion with Mr. Anderson that the practice of pumping the liquor repeatedly through the vessels, whether scrubbers or washers, intending thereby to purify the gas from ammonia, is an absurdity. It is, in fact, simply a costly way of manufacturing a small quantity of tolerably strong ammoniacal liquor.

In a previous communication I remarked that the washer is indispensable to efficient gas purification in Brazil. Condensation here is scarcely ever complete without its use. It therefore, as Mr. Anderson suggests, answers the twofold purpose of a condenser and washer, the tar and ammoniacal liquor flowing off together. Excepting by the employment of artificial means, too expensive in their application, we can rarely reduce the temperature of the gas below 80° Fahr., even with the copious use of water. I speak of Pernambuco, which is about 7° south of the equator.

It will be observed that my remarks on the washer have been confined chiefly to its use as a purifier of the gas from ammonia. There are other grounds for its employment in gas purification which deserve attention.

Gas-Works, Pernambuco, Oct. 15, 1874. Thos. Newbigging.

SUBJECTS DEFERRED.

Sir,—We who have to ply our calling far from your great city are sometimes much disappointed to find a very interesting subject started in the Journal, and then suddenly dropped, as if the writer had taken to arms or to wild sports far beyond the postal range.

Speaking for myself, I will take, to illustrate my meaning, three instances that have lately occurred. In the Journal of the 9th of June last we were favoured with a "preliminary notice" of a "New System of Photometry for Gas," by Dr. Wallace, of Glasgow, respecting which you truly remarked that "the scientific standing of the writer will command attention to his views." Unfortunately, we have never learnt what those views are.

Again, in your number for July the 14th, there is an article on "Heating Gas to Remove the Bisulphide of Carbon." So far so good; but where is the description of the "sulphide of ammonium process?" Here we are left in the cold.

Again, in the very next number, you print a startling statement respecting ammonia ("Gas Liquor and its Valuation"), a product of increasing value, much of which the writer shows is lost to the producer because of the imperfect means used for its estimation. Alas! having cried "Breakers ahead," he takes to his berth. Well, to my surprise I found that a large per centage of the ammonia could only be eliminated by distillation, a process which I do not consider handy for general use.

I therefore hope that some of your more chemical readers will put into shape a plan that will estimate *all* the ammonia present in gas liquor by some reaction process that will give its value or strength in ounces, similar to the present acid test.

Nov. 14, 1874. A Countryman.

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* See "The Portslade Gas-Works." By John Birch Paddon, M. Inst. C.E. Minutes of Proceedings of the Institution of Civil Engineers. Vol. xxxvii., series 1873-4.

GAS AFFAIRS AT BURNLEY AND ROCHDALE.

SIR,—Whilst agreeing with your remarks on the great evil of introducing political animosity into municipal affairs, as instanced in the attack on the Rochdale gas management, I think your remarks incidentally bear unfairly on the Burnley gas management. You state that "Burnley is pointed to as a place in which gas is much cheaper; but it is not pointed out, at the same time, that the gas is of a considerably inferior quality." Permit me to inform you, sir, that that is not the case. Burnley gas is *very little*, if at all, inferior to the Rochdale gas in illuminating power; that gas has not been 10 days below 17 candles the last 12 months, but very often over 20 candles. You then say, "Nor is it mentioned that meter-rents are exorbitantly high in Burnley, nor that the corporation of that borough get as much for lighting 640 public lamps as Rochdale charges for more than twice that number." We have 6400 meters, large and small, and the meter-rents amount to £997 6s. 4d. I think that is very far from being exorbitantly high. As to the public lamps, why, sir, the Rochdale Gas Committee merely supply the gas for the lamps; the cost of erecting pillars and all other expenses are charged in another department, the cost of which it will be necessary to know before instituting a comparison. The Burnley gas department have to find and erect the gas-pillars, lamps, fittings, &c., complete; to supply the gas, light, extinguish, and keep all in repair.

There are collateral issues arising from your remarks, but it would trespass too much upon your space to enter upon them at this time. We have fractious people in Burnley, too apt to catch at any pretence, that I could not allow your remarks to pass unchallenged, or I greatly fear they would have the tendency to bring about the Rochdale state of affairs in Burnley.

Burnley, Nov. 12, 1874. SAMUEL PETTY LEATHER.

THE TEST-ACID QUERY.

SIR,—This question is enveloped in fog, owing to the use of the term 10 per cent., which is all very well as applied to dividends, but is in the case of "10 per cent. acid" a misnomer, since the acid in the mixture does not bear that proportion, either by weight or measure. Call it "pound to the gallon acid," and all perplexity will be removed, for this term exactly expresses its composition, it being prepared by adding water to a pound of concentrated acid of 1845 specific gravity, until the mixture measures one gallon. There would, of course, be no difficulty in using test-acid 10 ounces to the gallon, or 20 ounces, or any other quantity; the measure would simply have to be divided into 10 parts or 20 parts, instead of 16.

The end in view is to ascertain the number of ounces of SO_3 required to saturate a gallon of liquor. It would be inconvenient to operate on so large a quantity as a gallon, and to *measure* the liquor and *weigh* the acid would also be inconvenient, while the use of concentrated acid, owing to its small bulk, would lead to error; consequently, for the convenience of measurement, the strong acid is diluted, a known quantity, say a gallon, containing a known weight—16 ounces of acid. Now take, for example, a gallon of liquor, and having divided the test-acid into 16 equal parts (each one of necessity containing one ounce of concentrated acid), add these parts one by one to the liquor until the point of saturation is reached; should it be at the tenth, the strength will be 10 ounces; if all are required, 16 ounces; and so on in proportion. It is not, however, necessary to use gallons; any tube graduated into 16 equal parts, no matter what its capacity, can be used, first filling it with liquor to the extent of the 16 divisions, then with acid, when each division absorbed by the liquor will represent one ounce of strength.

I have for many years prepared the test-acid here, a pint at a time, using 2 ounces of concentrated acid, and have never troubled myself about 10 per cent. or the specific gravity of the solution, the only specific gravity I care about being that of the strong acid, doing all the rest by weight and measure.

If "Alpha" will dismiss "10 per cent.," and "specific gravities," and "liquid pounds" from his mind, and look at the question in a common-sense manner, he will, I think, soon see the fallacy of his suggestion, and Mr. Hunt will also see that his laudable desire to deal exact justice between buyer and seller may be met by more simple and effectual means than those adopted by him. Mr. Bannister was right in the main, but committed the mistake of importing the term, "10 per cent. acid," as the description commonly used, without showing that it was not correct, and also, I think, in stating the specific gravity of the mixture to be 1068·2, if he did so state it, for 1 lb. of 1845 acid is by measure about one-twentieth or ·0542 of a gallon, therefore requiring ·9458 of a gallon of water to fill the measure, equal to 9·458 lbs., which, added to the pound of acid, gives 10·458 lbs. as the gross weight, the specific gravity of which should be 1045·8, and this I find by actual experiment is very near the mark.

In reference to the inquiry by "G. H." as to my opinion of Mr. Hills's liquor process, I must at present refer him to the statement made in my address as President of the British Association of Gas Managers, in June last. I am actively at work adapting apparatus to the complete carrying out of the process, and, therefore, prefer waiting until everything is complete and perfect before giving a detailed account of the results, which, however, I may state, are perfectly satisfactory. I will only add that your readers shall have the full benefit of my experience in this matter. GEORGE LIVESEY.

South Metropolitan Gas-Works, Old Kent Road, Nov. 14, 1874.

FATAL ACCIDENT AT THE SURREY CONSUMERS GAS-WORKS.—On Friday last, Mr. W. J. Payne, the City coroner, held an inquest at Guy's Hospital, touching the death of Thomas Hughes, aged 49 years. Mr. Henry Finlay, engineer of the Surrey Consumers Gas Company, said the deceased was a retort-setter, employed at the works at Rotherhithe. On the previous Saturday he was engaged repairing the slates on the roof of the retort-house. Witness, while inside the house, saw the deceased fall from the top of the building. He rushed out and found the deceased lying upon the ground. He was at once placed in a cab and conveyed to the hospital. From further evidence, it appeared that the deceased was accustomed to the work, and that at the time of accident was in the act of turning round to come down from the roof, when he fell. The roof was a slanting one, and he had a step-board to prevent him slipping. Dr. Chicken, of Guy's Hospital, said the deceased had a compound fracture of the left leg and right hip. The left leg was amputated, but he died on Wednesday. The jury returned a verdict of "Accidental death."

Legal Intelligence.

COURT OF CHANCERY.—WEDNESDAY, NOV. 11.

(*Before the* MASTER OF THE ROLLS.)

BOWER *v.* FOREIGN AND COLONIAL GAS COMPANY, LIMITED, AND OTHERS.

This case came on by way of demurrer to the plaintiff's bill, the demurring parties being the defendants, Messrs. Le Feuvre and Marshall.

The plaintiff, Mr. George Bower, is a contractor for public works, residing at St. Neots, and the defendants are the Foreign and Colonial Gas Company, Limited, Richard Venner, William Henry Le Feuvre, Henry Marshall, and the New Gas Company, Limited.

The bill stated that the defendants, the Foreign and Colonial Gas Company, were a company registered under the Companies Acts, 1862 and 1867. That the defendant Le Feuvre, the principal promoter of the company, procured the grant of a concession from the Government of the Regency of Tunis, for lighting Tunis with gas for 50 years; and obtained the concession with a view to the formation of the company, Le Feuvre causing himself, together with two other persons (his nominees) to be appointed the first directors of the company. That agreement for the sale of the concession to the company was executed on the 18th of July, 1872, the purchase price being £50,000, £10,000 being payable in cash by bills of exchange at three months date, and the balance, £40,000, by the issue to the defendant Le Feuvre, or his nominee, of 4000 fully paid-up shares of £10 each in the company. That the sum of £50,000 exceeded the actual value of the concession, and that the plaintiff was entitled to treat Le Feuvre as a trustee of the concession on behalf of the company. That Le Feuvre had procured the payment to himself of the sum of £50,000, and has not carried out the terms of the agreement that he should transfer the concession, works, &c., to the company. That if the company were not entitled to treat Le Feuvre as a trustee of the concession, that the agreement was not binding on the company, as the same had never been ratified and adopted on the part of the company as to have become binding. That the plaintiff, on or about the 3rd of July, 1872, before the registration of the company, was induced by Le Feuvre to sign a memorandum appended to a specification relating to certain materials and works required to be supplied and performed on behalf of the company, by which memorandum the plaintiff purported to agree to supply the materials and carry out the works for the sum of £19,500. That the plaintiff was induced to sign the memorandum through the representation of Le Feuvre, who alleged, but contrary to the fact, that the company were a solvent and responsible company. That at the time such representation was made by Le Feuvre, not more than 54 shares of £10 each had been allotted, other than 4000 shares allotted to Le Feuvre, and not more than £119 of the capital of the company had been paid in cash. That shortly after the 3rd of July, 1872, the plaintiff became apprehensive as to the accuracy of the representations made by Le Feuvre as to the position of the company, and refused to furnish the materials to carry out the works without some better security for payment than the liability of the company; and Le Feuvre thereupon proposed to procure some other person who, together with himself, would enter into an agreement with the plaintiff with reference to furnishing the materials and carrying out the works on their own personal and individual responsibility as regarded payment. That the plaintiff accepted the proposal on or about the 19th of July, 1872, and a supplemental agreement was entered into between Marshall and Le Feuvre, as guarantors on behalf of the company, and the plaintiff, by which it was agreed that £10,000 in cash and £9500 in debentures of the company, bearing interest at the rate of 8 per cent., should be paid to the plaintiff. That the recital contained in the agreement that the concession was vested in the company was untrue, the same being vested in Le Feuvre, who now claims a lien on the same in respect of unpaid purchase-money. That at the time the agreement was entered into Marshall and Le Feuvre were directors of the company, and both knew that the concession was vested in Le Feuvre, although they induced the plaintiff to believe that the concession was vested in the company. The plaintiff, after the date of the agreement, proceeded to carry out the works, and the company, at Le Feuvre and Marshall's request, at various times issued to the plaintiff 18 debenture bonds of the company for £500 each, and upon such bonds the sum of £9000 was due, together with a large arrear of interest. The bonds issued were under the seal of the company, and purported to assign to the plaintiff all and every the undertakings, plant, mains, assets, real and personal, of the company, the rents and profits of the company, and all the estate, right, title, and interest of the company, together with interest at 6 per cent. That the plaintiff, in November, 1873, became aware that the company were in difficulties and unable to meet their engagements, and he thereupon served a notice on them requiring payment of the debentures and interest, which the company had not complied with. That the plaintiff was entitled in equity to a first charge on the undertaking, and on the whole of the real and personal property of the company, in priority to the claims of all persons. That Marshall claimed to be entitled to two debenture bonds, dated the 30th of November, 1872, for £500 and interest in priority to the charge of the plaintiff, and that the bonds were issued to Marshall at a time when he was a director of the company, and that he ought to disclose the circumstances under which the bonds were issued to him. That the company, about the 25th of November, 1873, issued a bond to the defendant, the New Gas Company, for £5000, who insist that that sum is a subsisting charge on the company's works. That the defendants, the New Gas Company, had notice prior to November 25, 1873, before they advanced the money, of the plaintiff's equitable charge by and in virtue of his debenture bonds. That the defendant Le Feuvre claims to be entitled to a debenture bond, dated Nov. 26, 1873, for £5000, and insists that the same is a subsisting charge on the property of the company. That the plaintiff is ignorant of what the real and personal estate of the company consists, and that the defendants ought to set forth an account thereof. That the real and personal property of the company are not of sufficient value to pay the amounts due and to become due to the plaintiff, unless Le Feuvre is compelled to account and pay over to the company the moneys which he is liable to account for. That Le Feuvre being still a director of the company, and exercising control over the management of its affairs, the plaintiff will be unable to completely enforce his equitable charge under and by virtue of his securities, and obtain adequate relief, unless Le Feuvre is compelled to account and pay over to the company the moneys for which he is accountable. That the defendant Richard Venner is the secretary of the company, and he is a necessary party to the suit for the purposes of discovery. The plaintiff prayed that it might be declared he was entitled, by virtue of the debenture bonds issued to him, to an equitable charge upon the whole of the real and personal estate and undertaking of the company for the sum of £9000 and interest in priority to the claims of Le Feuvre, Marshall, and the New Gas Company, Limited. That the company should treat Le Feuvre as a trustee of the concession and property comprised therein, from the time he first became grantee thereof; or, if it should appear more advantageous to the company, that the agreement of the 18th of July, 1872, should be declared fraudulent and void, and be set aside, and that it may be declared the company are entitled to a lien on the concession and premises for all moneys paid by the company for the purpose of carrying out the concession. That an account might be taken of what is due to the company from Le Feuvre on the footing of Le Feuvre being treated as a trustee, or in the event of the agreement being declared fraudulent and void, that an account might be taken on the footing of the agreement being set aside. That in taking such accounts the shares

allotted to Le Feuvre or his nominees under the agreement might be treated as cash. That Le Feuvre might be ordered to pay over to the company the balance found due, and if necessary that the amount in respect of which the company is found entitled to a lien on the said concession may be raised by a sale of the concession. That an account might be taken of what is due to the plaintiff for principal, interest, and costs, and that the same might be raised and paid by a sale of a sufficient portion of the property of the company, or in such other manner as the court should think fit; or that the defendants (other than Venner) might pay to the plaintiff the amount found due, or in default the defendants might be foreclosed of all right or equity of redemption in the property of the company comprised in the debenture bonds. That in the meantime a receiver should be appointed, and that the company should be restrained from creating any charge or incumbrance on any portion of the company's property to the prejudice of the plaintiff; and that all proper accounts and inquiries should be taken and made, and directions given.

To this bill the defendants Le Feuvre and Marshall demurred on the ground of multifariousness.

Mr. SOUTHGATE, Q.C. (with whom was Mr. DANIEL JONES), appeared in support of the demurrers, and asked his honour to allow them on the ground of multifariousness. The plaintiff's original bill was filed against the Foreign and Colonial Gas Company, Richard Venner being made a defendant for the purpose of discovery; but afterwards the bill was amended, making Le Feuvre, Marshall, and the New Gas Company defendants. The plaintiff was a mortgagee of the company—the company disputed the claim; and then he made certain persons, whom he represented to be debtors of the company, parties to the suit, for the purpose of getting in assets in an improper way. Finding there were no assets, he attacked the debtors right and left. The defendants wished to get rid of a ridiculously oppressive suit, so as to save the expense of putting in an answer to a bill which could not be sustained.

The MASTER OF THE ROLLS (without calling upon Mr. Fry and Mr. J. Bradford for the plaintiff) said he was of opinion that the demurrer must be overruled against both defendants. As he understood the case, the plaintiff said he was a mortgagee of the property of the Foreign and Colonial Gas Company. The first defendant who demurred, Le Feuvre, also claimed two charges on the property of the company, one charge for a lien for unpaid purchase-money on the concession, as part of the company's property, and the other in respect of a mortgage similar to the plaintiff's. The other defendant who demurred, Marshall, claimed a charge on the property of the company similar to that of the plaintiff. As regarded both defendants, the plaintiff claimed priority over them, and said, as regarded one defendant, his alleged lien did not exist, and not only did not exist, but when the matter was investigated it would be found to be a sham purchase, and that the purchase-money which had been paid him was improperly paid and was due from him, and he wished to establish that his security had priority over that alleged lien. As regarded Le Feuvre's second security, the plaintiff also alleged that he was entitled to priority, and said if Le Feuvre owes the company £50,000, of course the second security had been paid off, and in that way it was necessary to determine whether he did owe any money. So that, in both ways, it being a solitary transaction, as regarded the lien, to ascertain whether he had a lien for unpaid purchase-money, or was merely a trustee, and owed the company that money, the amount claimed to be due from him, it became necessary to ascertain whether the second charge was subsisting or had been paid off. It might be when the account was taken he might not be able to get the balance paid over, but upon that a word might be said. As regarded the second defendant who had been a party to the suit, he claimed a charge over the same property as the plaintiff, and the plaintiff said he claimed priority over him, and therefore it would be necessary to have the priority settled. He had an interest in both the other questions also, because, being a mortgagee, he was interested in the question whether Le Feuvre had a good charge by way of lien or by way of mortgage. It was said you could not make Le Feuvre pay over the ultimate balance—that is, when you have wiped away both these charges by the investigation, with all of which he was connected. That might or might not be so. If you could not, it was a demurrer for want of equity, in respect of so much of the bill as prayed, that he might pay over the ultimate balance, but that was a question of some nicety. The plaintiff claimed a charge on the assets of the company, including the balance due from Le Feuvre, and it might be in a suit so framed, it was necessary to investigate and take the accounts as between Le Feuvre and the company, with the view of seeing whether his charge had been satisfied or not. It might be that the court would see its way also to realize the assets in the suit, but that did not go to the question of multifariousness, but to the question whether the whole of the relief prayed should be granted at the hearing. He was not prepared to say it would not be granted if the whole of the allegations were made out, but it seemed to him that the defendants, Le Feuvre and Marshall, were both interested in every atom of the allegations, and it also appeared to him that the allegations were connected together, because the two questions were simply questions of charges on either the identical property, or on property comprising the other portion of the property of the company, and therefore they were really questions simply for deciding the question as to the priority of the charges. It seemed to him that the demurrer, which was simply addressed to convenience, was put in in a case where the question was whether it was more convenient to take the examination into the truth of the whole of the allegations in one suit, and not in two. Therefore both demurrers would be overruled, and with costs.

Mr. SOUTHGATE said, having regard to the allegations in the bill, the parties would require time to answer.

The MASTER OF THE ROLLS, after a short discussion, allowed the defendants six weeks to put in their answer.

THURSDAY, NOV. 12.

(Before Vice-Chancellor BACON.)

THE ATTORNEY-GENERAL *v.* THE CORPORATION OF BIRMINGHAM.

Mr. COSENS HARDY appeared for the respondents, and said there was an order of sequestration in this matter, and he had to move that the sequestration should be discharged, the order to be made hereafter being without prejudice to the rights of the relators, the defendants undertaking to pay the costs of the motion. The bill was filed in 1870; the decree was made in March, 1871; in July, 1872, sequestration was made. That order was suspended from time to time until that day. The corporation had been pressing on, and in such a manner as to satisfy the relators, and Mr. Kay was instructed to consent to the application.

Mr. KAY, Q.C., who appeared for the Gravelly Hill Relators, said it was important that it should be understood that the matter should remain in exactly the same position with regard to other points. The works at Saltley now would require the most constant supervision and attention to prevent nuisance arising again. The position was this—the corporation had got against them a decree for an injunction, by reason of the breach of which an order in sequestration had been obtained. Under the pressure of that order the corporation had at last become active, and they reduced the nuisance very considerably; but the condition of things was such that, unless the pressure was continued, at any date, or in any week, the nuisance might become as great as ever. He was most particularly anxious that the decree should not in any way be affected by the relators not opposing the present application for the discharge of the sequestration.

The VICE-CHANCELLOR said it was so expressed in the notice of motion, and he assented to the application.

(Before Vice-Chancellor HALL.)

THE ATTORNEY-GENERAL *v.* THE CORPORATION OF BARNSLEY.

Mr. KARSLAKE, Q.C., said the corporation had been diligently endeavouring, in obedience to the court, to devise a plan for removing the nuisances of which complaint was made.

The VICE-CHANCELLOR: Have you come to the conclusion as to what you should do?

Mr. KARSLAKE said he thought they had. The corporation had had an enormous difficulty to deal with; but now they only wanted further time to finish the works. What they had determined to do was to purchase a large tract of land for the sewage.

The VICE-CHANCELLOR: I do not want to know what you are going to do. If you have come to a conclusion as to the plan you mean to adopt, how long do you say it will take to carry it out?

Mr. KARSLAKE asked for leave to name the time next week.

The VICE-CHANCELLOR: In the meantime the other side will consider whether they are satisfied that it will come to a conclusion in the time necessary.

Mr. KARSLAKE said they wanted to act *bonâ fide*, and they had taken a great deal of trouble.

The VICE-CHANCELLOR: There is such a thing as expedition as well as trouble.

Mr. KARSLAKE said in a short time they would be really using this sewage over a large tract of land.

FRIDAY, NOV. 13.

(Before Vice-Chancellor MALINS.)

In re THE EUPION GAS AND FUEL COMPANY, LIMITED.

On this petition being mentioned to-day, Mr. GLASSE, Q.C., who appeared for the petitioner, said he must now press for an order to wind up.

Mr. HIGGINS, Q.C., said he should oppose it.

The VICE-CHANCELLOR asked who he appeared for.

Mr. HIGGINS said before he answered that question he would, first of all, say that he was instructed, when the petition was called on, to move to strike out certain passages for scandal, and upon that question he should have to take his honour's judgment, because probably a greater abuse of the process of the court was never known. He appeared for Mr. Samuel Gurney Fry.

Mr. GLASSE remarked that Mr. Fry was not a shareholder, for he had in his hand a transfer of all his shares.

Mr. HIGGINS said that in that case it was the greater scandal to make such charges as were alleged against him in the petition, and which only came to his knowledge by a mere chance.

Mr. GLASSE said he had not been served with any notice of motion.

Mr. HIGGINS said it was not necessary to serve a notice of motion in such a case, as he was prepared to show by authority.

The VICE-CHANCELLOR suggested that he had better hear what the passages complained of were.

Mr. HIGGINS said they were pure scandal, and had no relevancy whatever to the issue raised by the petition, which was that the company was unable to pay its debts. Instead of confining themselves to that, they went into the whole history of the company, telling the same story as had been told before the Lord Mayor, and charging Mr. Gurney Fry by name with the grossest possible fraud.

The VICE-CHANCELLOR said he would suggest for the consideration of Mr. Glasse whether it was worth while to insist on these allegations.

Mr. GLASSE said he could not withdraw them, but he would ask that the petition should stand over for a week, with liberty to amend.

The VICE-CHANCELLOR: Yes. You may amend it by striking out those passages.

Mr. GLASSE: I simply ask that it may stand over to next petition day, with liberty to amend.

Mr. ALEXANDER said he appeared for a creditor, and he asked that the company should be wound up. He wanted his money.

The VICE-CHANCELLOR: You cannot have all you want. The petition will stand over till next petition day.

In re THE PETERSBURG AND VIBORG GAS COMPANY, LIMITED.

This also is a petition for winding up, which was discussed at considerable length on the 6th of August, when the proceedings were fully reported in our columns, and the nature of the case made by the petition stated. It will be remembered that the petitioners are the liquidators of the Patent Gas Company, Limited—a company which is being wound up voluntarily—who are the holders of 1000 shares in the Petersburg Company. The latter company were incorporated in February, 1872, the object being to purchase a concession for making gas-works and lighting with gas part of the towns of Petersburg and Viborg and adjoining district. The proposed capital was £150,000, in 15,000 shares of £10 each, of which 10,000 had been subscribed, the petitioning company holding 1000, on which, as on all the other shares allotted, £2 10s. per share had been paid, leaving £7 10s. per share still uncalled. The petitioners contended that the company had not yet commenced business, that the whole of the capital yet paid up had been expended in fruitless preliminary expenses, and even if the whole of the remaining capital were paid they would be unable to complete their works, at any rate in time to prevent the forfeiture of the concession; and therefore, in order to save the £7500 for which they were still liable, they asked for a winding-up order under the 79th section of the Companies Act, 1872, which empowers the court to wind up a company where it has not commenced business within a twelvemonth of the date of incorporation, or where it shall appear "just and equitable" to do so.

Mr. GLASSE, Q.C. (with whom was Mr. LATHAM), now repeated his application for a winding-up order on the same grounds as previously alleged. At the same time he offered to withdraw the petition if the company would accept a surrender of the shares held by the petitioners, so as to exonerate them from any further liability.

The VICE-CHANCELLOR asked if the company would not accept this offer.

Mr. PEARSON, Q.C., who, with Mr. BROOKSBANK, appeared for the company, said he should insist on the petition being dismissed with costs.

Mr. GLASSE then proceeded to state the nature of the petition, and, in reply to a further question from the bench, said he believed the company were at present doing absolutely nothing.

Mr. PEARSON said they were carrying out the objects of the company as stated in the Memorandum and Articles of Association, and had just obtained an ukase from the Czar authorizing the carrying on of their operations.

Mr. GLASSE repeated that he was quite willing to give up the £2500 already paid on being relieved from further liability. He then proceeded to read the affidavit filed verifying the petition.

Mr. PEARSON having read the affidavits filed by the chairman, secretary, and engineers of the company,

Mr. LATHAM read the cross-examination which had taken place upon them.

It appeared in the course of the evidence that under the Articles of Association no shareholder was at liberty to transfer his shares without the consent of the directors, that a settling-day had been granted by the Stock Exchange, and that the delay in executing the works in Russia had arisen from the necessity for obtaining an extension of time, and for getting a good title to the land on which the works were to be erected, but mainly from the high prices of coal and iron, which had rendered it advisable not to enter too hastily into any contracts. It was also stated by the chairman and secretary that an extra-

ordinary meeting had been held on July 2 last, when shareholders holdin 9325 shares were represented, either personally or by proxy, all of whom except the petitioners, opposed the winding up; and a resolution was passed, with but one dissentient, authorizing the directors to strenuously oppose the petition.

Mr. *Edward Pearce Browne* and Mr. *Thomas Randolph Mellor*, gas engineers, gave evidence as to the value of the concession, the suitability of the land which had been purchased for the purposes of the company, and the pendency of negotiations with respectable firms in Birmingham, London, and Glasgow for the execution of the works.

The VICE-CHANCELLOR again asked if some arrangement could not be come to.

Mr. GLASSE said he should be willing to give a consideration for the surrender of the shares.

Mr. PEARSON said he could only agree to a surrender on payment of the full amount yet to be called up. The petition ought never to have been presented. The directors had been instructed by a vast majority of the shareholders to oppose the petition, and he could only carry out their wishes.

The VICE-CHANCELLOR: A small minority desire to stop the concern, and the large majority desire to go on.

Mr. GLASSE: We do not care about stopping it, but we want to get out of it, and we will make a sacrifice to do so.

The VICE-CHANCELLOR: Will you consent to a transfer of their shares, Mr. Pearson?

Mr. PEARSON: To responsible shareholders, certainly.

Mr. GLASSE: Nobody will take the shares unless we pay them to do so. We will pay the other shareholders a reasonable sum to take them off our hands.

Mr. PEARSON said there was no rule of law or equity which could compel shareholders in a company to buy up those who wished to go out.

Mr. GLASSE said he was quite aware of that, and he must, therefore, insist on having the winding-up order to which, he contended, he was entitled.

Mr. LATHAM having concluded the reading of the evidence,

The VICE-CHANCELLOR said he supposed nothing had been done since the 6th of August.

Mr. PEARSON said they had obtained an ukase from the Czar, as they were informed by telegram on the 9th of October, the conditions being that there should be an agency established in Russia with full power to act for the company; that the agency should be subject to Russian law in all transactions coming within Russian jurisdiction, and that the conveyance of the land into the name of the company be carried through in accordance with the regulations of the Russian empire.

Mr. GLASSE then addressed the court in support of the petition, arguing that the company had not, in fact, commenced business within a year from the date of incorporation; indeed, they had only obtained the ukase authorizing a part of their operations on the 9th of October, after the presentation of the petition; and they had still to obtain another ukase before they could proceed to break up the streets for the purpose of laying the mains, &c. They had spent the whole of their money, within a mere trifle, in preliminary expenses, and in paying officials; and although they had passed a resolution for increasing the amount of capital to £250,000, seeing that only two-thirds of the original issue had been subscribed, there was not much likelihood of their obtaining the amount required for the completion of the works. Not one single step had been taken towards the manufacture of the gas, nor even towards the erection of the works. They said they had obtained the land, but it was only on the 9th of October, long after the presentation of the petition. Since the decision of Lord Cairns, in the Surburban Hotels Company, there had been plenty of authority to show that where the subject matter on which the company was established was altogether gone, or where it was in such a state that it was absolutely impossible for it to be carried on with success, the court would not allow solvent shareholders to be called upon to pay calls merely that the money might be spent by the solicitor, engineers, and other officials of the company.

The VICE-CHANCELLOR said if that proposition were to hold good he must be very clearly satisfied that if the company went on it must result in a loss. There was a body of men with 10,000 shares not paid up in full, so that if they went on they must pay more money; and nine-tenths said it would result in a profit if they went on, and one-tenth said it would end in a loss. If he were satisfied that it could only result in a loss, he should not hesitate much about making the order.

Mr. GLASSE urged that his honour must decide the case upon his own judgment, and not by the opinion of nine-tenths of the shareholders. He contended that the £2 10s. per share had been expended without one step in the direction of really establishing the company; and he could show on the figures that it was absolutely impossible it could be successful. They asked for 15,000 shares in the first instance, and only got 10,000 subscribed, and every farthing of the £2 10s. per share paid up had been expended in preliminary expenses. It was very strange, if the other shareholders had so good an opinion of the concern, that they would not accept his offer to surrender 1000 shares with £2 10s. paid up, and even to give a substantial sum in order to have them taken off his hands.

The VICE-CHANCELLOR: They may say, "We have a very good opinion of it, but we have embarked a considerable amount, and we do not wish to increase our stake." If they accept a transfer of your shares, somebody must be liable to pay the future calls.

Mr. GLASSE proceeded to cite the Tumacarory Mining Company's case, in which his honour had made a winding-up order on the ground that the company had never taken possession of the land in the United States, said to have been purchased, and that no business had been carried on since the formation of the company.

The VICE-CHANCELLOR said he understood that order had been discharged.

Mr. GLASSE said it had been discharged by consent, and very likely the same thing would occur in this case if an order were made, because the company would then find it to their advantage to take the shares of the petitioners. He would also refer to the Great Northern Copper Mining Company of Australia, before the late Master of the Rolls, in which the minority wished it to be wound up, whilst the majority wished it to be continued. The company was formed in 1859, for the purpose of working certain copper mines in Australia, but, after working successfully for some time, the lode was lost, and could not be recovered. In 1865 a petition was presented, but his lordship declined to make an order without ascertaining the wishes of the shareholders, and it was dismissed. Subsequently, another petition was presented, and notwithstanding a majority of shareholders were in favour of going on, the Master of the Rolls ordered the company to be wound up. There the substratum of the company was gone; but in this case, he contended it had never existed, and therefore it was much stronger. In the Surburban Hotels Company's case, Lord Cairns had referred to the case of *Baring v. Dix*, where a patented invention had failed, and it being impossible that the partnership business could be continued, it was ordered to be wound up. It was hardly necessary to refer to the numerous authorities, showing that in cases of private partnership, if it was proved that the partnership could not be successfully carried on, the court always ordered a dissolution.

The VICE-CHANCELLOR: There is no doubt about that.

Mr. GLASSE: Lord Cairns said the same rule must be applied in the case of a company. He (Mr. Glasse) did not care for the opinions of the holders of 9000 shares, especially as they would not take his 1000 shares at a gift. Was it possible, if all the shareholders paid up in full, that sufficient money could be raised to establish this business? And if not, the court would not allow money to be dragged out of the pockets of solvent shareholders, in order that it might be spent for the pleasure or profit of those employed by the company. Lastly, assuming the court to be against him on these points, he contended that as nothing substantially had been done until after the filing of the petition, it would not be just, looking at the state of circumstances when the petition was presented, even if it were dismissed, that the petitioner should be saddled with the costs of it.

Mr. LATHAM followed on the same side, and after referring to the words of section 79 of the Companies Act, 1862, repeated the argument of his leader that even if all the future calls were paid up it would be impossible, on the evidence, for the company to be successful, looking to the limited time allowed for the completion of the works. After going through the figures, he contended that they resulted in almost mathematical proof that by the time the works were finished the company would be bankrupt, or unable to pay its debts. He cited passages from the judgment of Lord Cairns in the Suburban Hotels Company, to the effect that if it were shown to the satisfaction of the court that the continuation of the company could only end in bankruptcy, the court would interfere and order it to be wound up, although the majority of the shareholders might wish it to go on. That was precisely the case here, according to his view of the evidence, and it was impossible to say, in the absence of further information, whether the conditions on which the ukase had been granted, subjecting the company to Russian law, would not deprive the shareholders of the protection afforded in England by the Limited Liability Act.

Mr. GLASSE having cited two additional cases—namely, the European Assurance Company, before Lord Justice James, and the British Oil Company, before Vice-Chancellor Stuart, quoting *dicta* from both those judges to the effect that the court would wind up a company where it saw there was no prospect of its being successfully carried on—

The VICE-CHANCELLOR said he did not think he need call upon Mr. Pearson. When it was first mentioned to him on August 6, he was much more impressed with the desirability of making an order to wind up than he was to-day, for the reasons he would give. The case presented to the court was this. The company was formed in the month of February, 1872, to acquire a concession for the purpose of lighting with gas a portion of the city of St. Petersburg and Viborg, which was an adjoining district, and, when that concession was obtained, to erect the necessary works, and carry on the manufacture of gas. The proposal was that the company should consist of 15,000 shares of £10 each, which would be a capital of £150,000. It appeared that they had succeeded in issuing 10,000 shares, thus obtaining £100,000 worth of capital, all of which, he understood, had been paid up to the extent of the calls already made of £2 10s. per share. Thus £25,000 of capital had been obtained in cash, and paid, in addition to which there had been issued to certain persons in Russia 700 fully paid-up shares, for a consideration to which he had not heard any objection raised. That, therefore, made £7000 more. However, what was most important was, that a capital of £25,000 had been paid on the 10,000 shares issued. The petitioners were a joint-stock company, the Patent Gas Company, Limited, which was now being wound up voluntarily, who appeared to have taken 1000 shares, on which, in common with the allottees, they had paid £2 10s. each, making £2500. It appeared that a contract had been entered into between this petitioning company and the company sought to be wound up, by which the petitioning company were to have their process of manufacturing gas adopted, and of course they expected to have a very profitable contract; in the first place by using their process, and in the next because, if it had succeeded in St. Petersburg, it would have become known, and, of course, would have been a good introduction for them. However, experience showed that the process of the petitioners could not be carried on commercially to a profit, and therefore their company, though perfectly solvent, was being wound up voluntarily, and this was, in fact, a petition by its official liquidators. The petitioners were very much dissatisfied, and seemed to have formed a very decided opinion that to go on with this concern was hopeless, that it could only result in a loss, and that if they were called upon to pay the remaining £7500 for which they were liable, it would be, to use a common expression, throwing the money into the gutter. On the other hand, the company had had meetings, and he had heard no imputation on the character of the persons constituting those meetings, except that it was said that two or three of them were of doubtful solvency. He need not mention the names, because that was a consideration into which he could not enter, especially as all the shareholders had paid up the calls which had been made, and, therefore, he had no right to suppose that they would not pay any further calls which would be made. The petitioners, holding one-tenth of the issued capital, taking this strong view of the case, meetings had been called again and again, to consider this subject, when it appeared that the holders of the remaining nine-tenths took a totally opposite view. They admitted they had great difficulties to contend with, as anybody becoming a member of a company for the purpose of manufacturing gas in a city like St. Petersburg must have expected, and considering the distance they had to send, the different laws they would have to be regulated by, the forms that would have had to be gone through, and the various other difficulties of the enterprise, the only thing that surprised him was that any body of men could be found to embark in an undertaking of that kind. However, they had thought proper to do so; and these meetings having been called, it was distinctly proved and not disputed, that of the holders of the 10,000 shares issued the petitioners were the only dissentients. All the rest, to the number of 8327, either personally or by proxy, on the 2nd of July last, voted for continuing the concern. There were 548 who did not attend, either personally or by proxy, and gave no opinion; but as they did not object, he was not warranted in assuming that they held with the views of the petitioners. Under these circumstances, whatever might be his own opinion, was he at liberty to act upon that individual opinion? He might have a very distinct opinion that a concern established for such objects was not very likely to succeed. He did not say that was his opinion; but suppose he had such a distinct opinion, would he be warranted in acting upon it when he found that nine-tenths of those who had embarked in the concern held a different view, and gave this proof of the honesty of their opinion that they were ready to embark a large amount of further capital in it? He thought not. The Winding-up Act defined what might be the reasons for winding up a company, and the only one here relied upon was that whenever a company did not commence business within a year from the date of incorporation. It did not appear to have any debts, and therefore there was no question about its being able to meet its liabilities. The two grounds, therefore, upon which it was sought to wind it up were—that it did not commence business within a year, and that it was "just and equitable" that it should be wound up. With regard to its not having commenced business within a year, it was rather difficult to say in all cases precisely what commencing business meant. If it meant the actual manufacture and supply of gas, it was perfectly clear they had not yet begun business; but if, on the other hand, it meant doing that which was essentially necessary to put them in the position to supply gas, then it was quite clear that they had done a great deal. They had employed engineers; they had bought land, of which they were in possession, and they were ready, so far as they were not interrupted by the inclement season, to commence operations for the erection of their works. He could not, therefore, come to the conclusion that, within the meaning of the sub-clause of sec. 79, they had not commenced business within a year, for, having regard to all the objects they had in view, he thought they had commenced business, and were going on with it. Then came the question of the other sub-section which had

been relied upon, "wherever, in the opinion of the court, it is just and equitable that the company should be wound up." On that point he entirely adhered to the opinion which he had expressed in the Suburban Hotels Company, which was one of the first winding-up cases before him, and which was a company for building hotels in the neighbourhood of London. In that case it was proved to his satisfaction that the company was a failure, and would continue to be so, and that therefore every penny taken out of the pockets of the shareholders would be thrown away. Accordingly, he thought it was a case in which it was just and equitable that the company should be wound up, and made the order accordingly. That case went by way of appeal before Lord Cairns, who took a different view, and thought it was not sufficiently shown that it would be a losing concern, and therefore his original order was discharged. In the course of his judgment, however, though he differed from him on the facts of that particular case, Lord Cairns did not negative the principles upon which he had proceeded, but, on the contrary, expressly affirmed them. Having quoted a passage from Lord Cairns's judgment to this effect, the Vice-Chancellor continued that the principle upon which he had acted was thoroughly adopted, although in the particular circumstances Lord Cairns had differed from him upon the expediency of applying it in that special case. Other learned judges had taken the same view, as shown in the passages to which Mr. Glasse had called attention. It was therefore clearly established to be a rule of the court, which he should never hesitate to act upon, that if the court saw clearly that to call up more capital would only end in ruin and disaster—in other words, in the loss of the money that would be called up—an order ought to be made, and he should certainly not hesitate in such a case to make an order for winding up the company. But, in order to do so, the court must be perfectly satisfied that going on with the company would have these disastrous effects; and, applying that principle to the present case, he had before him a company which it was not pretended was a bubble company, but was formed by substantial persons for substantial objects. The shareholders had given proof of their faith in it by putting down large sums of money. £25,000 had already been paid, and if he were now to make the order to wind up, it was perfectly clear there was nothing to realize, and therefore those who had paid this £25,000 must lose every penny of it. With that they must lose more, because it was quite evident it would be necessary to make a call in order to pay the expenses of winding up. Such being the consequences of making a winding-up order, on the other hand, it appeared that if he did not make the order, nine-tenths of the shareholders were satisfied that by going on they would not only obtain a profit from the money they had already paid, but they would make profitable that which they would hereafter embark in it. Under these circumstances, therefore, it was not a case in which he could so see clearly that it would result in a loss, if the company went on, that he should be justified in setting his opinion against the opinion of those who were to find the sinews of war, and who knew perfectly well that, having already paid £2 10s. per share, they would have still to pay £7 10s. per share more. This was the strongest proof that reasonable business men could give of the *bona fides* of their opinion. Under these circumstances he did not think he could attend to the opinion of those holding only one-tenth of the shares, especially as, in the present case, instead of being an individual, it was a company being wound up, which, therefore, had a natural inclination to close all their transactions, and who would thus be induced to form a very favourable opinion with regard to going on with this company. On all these grounds, therefore, he came to the conclusion that the petition must be dismissed, and he supposed Mr. Pearson would not be satisfied unless it were dismissed with costs.

Mr. PEARSON: Certainly not.

Mr. KARSLAKE, Q.C., said he appeared for large shareholders to oppose the petition, and he must ask for his costs. It was a common form order.

The VICE-CHANCELLOR: You will not consent to the petition being dismissed without costs?

Mr. PEARSON: No; certainly not.

The VICE-CHANCELLOR said the petition must be dismissed with costs, and, of course, those appearing to support the view the court had taken must have their costs also.

COURT OF QUEEN'S BENCH, WESTMINSTER.—TUESDAY, NOV. 10.

(*Sittings in Banco, before Justices* BLACKBURN, MELLOR, *and* LUSH.)

THE EDGWARE HIGHWAY BOARD *v.* THE HARROW DISTRICT GAS COMPANY.

Mr. BAYLIS (Mr. DANIEL with him) appeared for the plaintiffs; Mr. PHILBRICK, Q.C. (with him Mr. FITZGERALD), appeared for the defendants.

The plaintiffs in this case had licensed the defendants to take up 1600 yards of a highway which was under their control, and the defendants promised to pay the plaintiffs 1s. for each superficial yard which was taken up. To recover this the present action was brought. The defences raised were, first, that the agreement was *nudum pactum*, there being no consideration moving from the plaintiffs; and, second, that the contract was illegal, since it authorized the defendants to commit an indictable offence.

The COURT, remarking on the shabbiness of the defence, thought that the licence did not authorize the defendants to do anything amounting to an indictable offence; that taking up the highway to put down gas-pipes would not amount to an indictable offence unless the whole highway were obstructed. The court was also of opinion that there was a sufficient consideration moving from the plaintiffs to found their claim.

Judgment for the plaintiffs.

MANSION HOUSE POLICE COURT.—THURSDAY, NOV. 12.

(*Before the* EX-LORD MAYOR.)

EUPION GAS SHARES.

The hearing of the charge against *Joseph Aspinall, Samuel Gurney Fry, George P. Knocker, John S. Muir*, and *C. Knocker* for conspiring to defraud members of the Stock Exchange, was resumed this day.

Mr. *John Hall*, Mr. *Pym*, and Mr. *Woods*, stockbrokers, gave evidence as to purchases they had made of Eupion shares for clients in Liverpool and elsewhere. Mr. Baillie, late of Bath, was one of the purchasers, and a cheque for differences sent to him was traced to the defendant Aspinall.

Mr. *Gamgee*, a financial agent, deposed to negotiations carried on with him by Aspinall and Muir for the sale of 15,000 shares. His evidence had not concluded when the case was again adjourned.

FRIDAY, NOV. 13.

Mr. *Gamgee* was recalled this morning, and his evidence completed. It related to the various sales which had been effected through his agency, and to the pretexts on which delivery was withheld.

Mr. *Rayner*, another financial agent, gave similar evidence as to the order he had received from Muir through a Mr. Spencer. In both cases Muir accounted for non-delivery by alleging that Fry had broken faith with him.

In answer to *Muir, witness* said Coates and Hankey never demanded, after the 28th of September the delivery of the shares. Witness had never applied to him for a single share to be delivered.

Replying to the MAGISTRATE, he said he knew nothing whatever of the Metropolitan Syndicate, but believed Muir, Gamgee, Ray, and other gentlemen, managed it. He presumed it was a financial agency on a large scale.

The case was adjourned until Thursday next, the defendants being admitted to bail in the meantime.

Miscellaneous News.

CONTINENTAL UNION GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders in this Company was held at the Terminus Hotel, Cannon Street, London, on Tuesday, Nov. 10—H. M'LAUCHLAN BACKLER, Esq., in the chair.

The SECRETARY (Mr. E. Garey) read the advertisement convening the meeting, and the following report of the directors, with the statement of accounts:—

Your directors have the pleasure to present their annual report, together with a statement of accounts for the year ending the 30th of June last.

A satisfactory increase has taken place in the company's business, and returns therefrom would have been highly favourable if coals could have been purchased during the period over which the accounts extend, on the terms at which they are now attainable; but, as you are already aware, such was not the case, and the large additional cost of coals has only been partially met by the greater value of coke and other products. The rate of exchange with Italy was also much against the company at the time when heavy remittances had to be made to England.

Your directors are glad to be in a position to state that an important change in these respects is now apparent. Contracts for coals have been effected at a considerable reduction on the prices submitted to last year, and shipping to Italy may be obtained on more reasonable terms, the rates of exchange are also lower than those formerly paid.

The number of new lights is satisfactory, and justifies the expectation that a large demand for gas will arise from such additional burners, and that the earnings will increase in proportion with the brightening prospects of the undertaking.

At Genoa the new gasholder, 120 feet in diameter, is nearly completed; the new retort-house, condenser, boilers, exhauster, and engines will shortly be brought into operation.

At Strasburg new boilers with engines and exhausters are being fixed for use during the present winter; additional purifying power has also been provided.

At Milan a large condenser was found indispensable to complete the apparatus, of which the new purifiers and scrubbers recently established formed part.

Other extensions of works and mains have been carried out at the different stations, but as they are of minor importance it is unnecessary to specify them more fully in this report.

In order further to improve the working of several stations, it is proposed during the current year—1. To lay a large main at Genoa, the effect of which will be to facilitate the lighting of the principal part of that city at lower pressures, and thereby to ensure a reduction of leakage. 2. To replace at Rueil nearly one mile of pipes, which have long been in a bad state, and from which the loss of gas has been so considerable as to materially affect the profits. 3. To revise the system of mains at Nimes, a portion being now of pottery ware. This has already been commenced over a limited area, and the measures thus taken have proved so successful in their results as to encourage your directors in applying them on an extended scale.

Under the lease held by this company of the 13 stations of the French society, *L'Union des Gaz*, and of which ten years remained unexpired, the above and other future improvements could not have been effected without incurring a heavy charge on the revenue of this company; but as they appeared to your directors essential to the efficient working of the undertaking, negotiations were opened with the *gérant* of the *Union des Gaz* for a revision of the agreement. It was found that an extension of thel ease would necessitate the payment of heavy duties abroad, whilst many difficulties which had arisen could not thus be permanently removed, b ut only deferred for settlement to a later date.

Under these circumstances it became advisable to consider the terms on which the lease might be cancelled, whilst the management of the *Union des Gaz* stations should be retained by this company.

Your directors have the greatest satisfaction in reporting that they have, after a protracted and anxious negotiation, succeeded in effecting a permanent arrangement, on conditions both equitable to the *Union des Gaz* shareholders, and highly favourable to the interests of this company.

At the termination of the lease, which would have expired in 1884, this company could not have relied on possessing an interest in the property exceeding £200,000, or one moiety only of the present share capital of the French society, whose managers had the option of repaying any further outlay made on their stations, and already amounting to nearly £600,000, either in cash or by an allotment of shares. They would undoubtedly have selected the former mode, if the undertaking were prosperous, but the latter if the contrary. In any case this company would not have had a right to more than the maximum number of 20 votes, allowed to any one shareholder by the statutes of the *Union des Gaz;* the entire management, therefore, would have passed into the hands of the French shareholders. Moreover this company would have had to appropriate annually, during the short remaining period of the lease, a very large portion of the profit, to extinguish the heavy charges for various extensions and renewals required to develop the undertaking successfully until 1884, and deliver it up in a good state, free from incumbrance at that time.

By the arrangement referred to the lease is cancelled, and the form of the French society is changed; so that, instead of being under the sole control of a *gérant*, it has become a *société anonyme*, similar to a joint-stock company in this country, and managed by a board of nine directors, three of whom represent the French shareholders, whilst six are identical with the six directors of the Continental Union Gas Company.

The share capital of the French society thus transformed is one million sterling, of which £200,000 is held by French shareholders, and £800,000 by this company.

The modified statutes allow one vote for every 10 shares, without limit to the number. Thus, your directors have secured the direct control of all the works for the entire duration of the society, and questions which had given rise to difficulties, and shackled the operations carried on under a divided management, attributable to the joint superintendence of the two companies, are now finally set at rest. In acknowledgment of these important concessions, by which the whole of the undertaking is virtually surrendered to this company, it has been agreed that the existing capital of the *Union des Gaz*, of which half is held by this company, and half by the French shareholders, at present receiving a dividend of 7 per cent., shall be permanently guaranteed, and will yield as at present 7 per cent. per annum net, or nominally 7½ per cent., subject to deduction of French taxes. When the profits shall exceed the sum necessary to pay a similar rate of dividend on all the shares of the company, the difference will be divided rateably amongst the total number, both preference and ordinary, in proportion to the amount paid on each at the time.

Your directors believe that the position of the company has thus been secured on a solid basis, which renders its future prospects more certain than had ever hitherto been the case, and that this substantial improvement has been realized on terms remarkably advantageous, when the vast interests involved are fully taken into account. They feel justified in congratulating the shareholders on the complete success of their plans, for the furtherance of which neither time nor trouble has been spared by them.

The available balance of the year's general revenue account is £45,009 16s. 6d.; out of this sum an interim dividend, at the rate of 4 per cent. per annum, has been paid on the ordinary shares, and at the rate of 7 per cent. per annum upon the preference shares, for the six months ending the 31st of December last.

Your directors have now resolved to declare a dividend at the rate of 5 per cent. per annum on the ordinary share capital, for the six months ending June 30 last, free of income-tax; and for the same period on the preference shares at the rate of 7 per cent. per annum, leaving £7840 17s. 11d. to be carried forward to next account.

The director who retires by rotation is Walter Thomas Fawcett, Esq. The retiring auditors are Joseph Hadland, Esq., and Frederick Tendron, Esq., all of whom, being eligible, offer themselves for re-election.

The CHAIRMAN: Gentlemen, in the first place I must express the regret I feel that Mr. Fawcett, who has usually taken the chair at these meetings, since the retirement of Mr. Cubitt, is unable through illness, which has affected him for some time past, to occupy this place to-day. I am afraid that I shall make but a poor substitute, and in what I fall short I shall have to ask your forbearance. The present meeting is being held later than usual, owing to the negotiations to which the report makes reference. It is true we might have held it at the usual time, and have come before you with the usual statement; but we could then have only dealt out mysterious hints, which would not have been satisfactory to any one, and I believe you will agree with me that it is better to do as we are now doing—that is, come before you with a full and complete statement of all the facts affecting the position of the company—a position which, I think, after the report read by the secretary, will be plain to every person in the room. Before I take leave of this subject I should say that in future it will be necessary to hold our meetings even a little later than this, because we shall not be in a position to make up our accounts until the *Union des Gaz* have held their meeting in Paris, and declared their dividend, our revenue depending largely upon

the dividend that may be declared by that society. I will now proceed to make a few comments upon the report; they need not be numerous, for I believe the report is so framed as to enter fully into each subject of interest to you. We have endeavoured to make it as clear as possible, and I hope we have succeeded in doing so. Apart from the question of the fusion, which is the main subject treated, the principal fact referred to in the report is the high price which we have had to pay for our coals in the year embraced in the accounts. Now, I know it may seem odd to some, that while coals are comparatively cheaper than they have been, we should be talking to you about the high prices we have paid. But you must recollect that these accounts began on the 1st of July, 1873, when coals were at a very high price—a price, too, that we had to pay in order to secure our provision. The previous year compared favourably with that, because, although coals were then at a high price in the market, we had contracts running which enabled us to purchase much below the current rates during the first six months of 1873. The question has been asked in the office to what extent we have been sufferers by this large cost of coal, and I will answer this question at once. We have had to pay £26,000 more for coal in the year to which the accounts now presented refer than we did in the previous year. We have had some little increase in the gas-rental—about 6 per cent.—£9500; but as regards coke, we have not had a large increase. I can only attribute that to the fact that in many places where we produce coke and in the neighbouring country, wood is the principal article of fuel, and that has not risen in price in the same proportion as coal; consequently the coke we produce and have to sell, which comes into competition with the wood, could not be raised in price to meet the additional cost of the coal consumed by us. In addition to the high price of coal, we have had something extra to pay for iron and for other materials used in gas-works, and especially for labour, which has risen considerably. Now there is the article of tar; I believe some remarks have been made about that. We get a very fair price for our tar, but we have not been able to realize any much larger price lately than we did formerly. Tar has risen very materially in England, and in some other countries, no doubt; but it has not been the case where our principal production occurs. Tar is an article which will not bear any great expense for transportation. Consequently we have to dispose of it as well as we can at the place of its production or very near to it, and unless there be a great demand on the spot, we cannot expect to realize a much enhanced price. We have, however, received something more for it than formerly, and, therefore, so much to the good. As regards other products—ammoniacal liquor, &c., they have fallen, I believe, everywhere, and consequently we have had no advantage in that respect. I now come to the improving prospects of the company alluded to in the report. They consist, apart from the great arrangement which we have carried out, in the fall in the price of coal, the more reasonable rate at which we obtain freights, the more favourable rates of exchange, and the great number of new lights we have secured. During the past year we had no less than 10,560 new lights, which gives us a very promising prospect for the future. Then, we have also the general improvement of trade on the Continent. And this is not confined to one or two of our towns, but extends to almost every one, and not only in this company, but in other similar undertakings it is perceptible. Our outlay for the past few years has been large, owing to the rapid growth of our business. We have spent a great deal of money, which, I believe, will be productive in future years. We are now relieved from some of the charges we had to incur in the past, and whatever we spend we shall look to very closely; and unless we are quite persuaded that it is a necessary expense to maintain the concern, and that it will be reproductive of good interest, we have made up our minds not to spend one single farthing. Reviewing these circumstances, I think that, unless we have another war—unless we are bombarded, as we have been—unless our houses are burnt down or swept away by an inundation—in fact, unless we have to go through fire and water—we are likely in future years to do much better than we have done during the past two or three years. Now I come to the great subject—the fusion of the *Union des Gaz* with this company. From the origin of this company the directors and managers made up their minds that the lease which they took over from the *Société d'Exploitation* would have to be altered. It was a workable lease, no doubt, but there were great difficulties about it. We could not stir an inch without consulting our colleagues in Paris, and the *gérant* there had the power to put his veto upon any of our proceedings. We have got on pretty well notwithstanding these drawbacks, but they prevented us from exercising that direct management which is so essential to the well-being of a company like this, and from bringing to bear any ability or experience which might have been acquired in the management of other concerns. They had, in fact, a paralyzing effect upon our efforts. In saying this, I do not mean to blame our colleagues in Paris, who have always done their best; but they had their interests to look after, and we had our own, and conflicts would occur, notwithstanding the existence of the best motives on both sides. We considered how we should treat this question of a ten years lease, at the end of which we should have had to give up the management. It is true we should then have been very large shareholders in the *Union des Gaz*, but we should have had 20 votes only; so that, in fact, we should have been nobodies. It was therefore a subject which must come up for settlement some time or other. We have watched it. I have myself only recently come on the board, but I have been connected with the company for many years, and had something to do with establishing it. We have therefore, I say, watched for the proper moment to arrive to deal with the matter, and it has been a very long and anxious negotiation for us all. We thought, and I dare say the idea occurred to you, that the best way would be to purchase up all the stations of the Union, so as to become sole proprietors of them, as we are of Messina and Montargis. But there were difficulties in the way. I assume we might have made an arrangement with the managers for a transfer, but had we done so the duty would have been exceedingly heavy. I estimate that the duty in France and Italy would have amounted to £100,000. That would have been money completely thrown away, and it was not to our interest to do it. In addition to that, the municipalities would have had something to say on the transfers of the concessions. I have found, as the result of 25 years experience in dealing with municipalities, that they always ask something in return for every concession on their part, and generally it is something very heavy. We therefore gave up that idea. The next point considered was how far we could make some arrangement to extend the lease. We thought it out very anxiously, but felt that if we succeeded it would only be postponing the evil day. It is true we might have spread the redemption and other items over a longer period by this course, but, as I say, it was only deferring the evil day, and we should still have to meet the question as we have now done, sooner or later. We therefore thought the only way was to get the lease cancelled, and endeavour to arrange it in such a manner as to obtain for this company not only the management which we have hitherto had, but also a more complete control over the entire affairs of the Union. You see by the report that we have succeeded in doing that, and what we now give in return is just what we are now giving to the French society—that is to say, a preferential dividend on their shares of 7 per cent. I think you will agree with me that it is surprising we succeeded so well. We met with encouragement from our colleagues abroad; they were willing to enter into the arrangement, provided the interests of their own shareholders were secured in that way. I do not think it necessary to dilate on the advantages of the arrangement to ourselves; they must be evident to every one. The agreement will take effect from the 30th of June last. The accounts now read have been prepared so as to embrace the arrangement made, and as they appeared on the 30th of June last, they will appear on the 1st of July unaltered. We therefore start the present year on a statement of accounts which summarizes all that we have done and the agreement we have entered into. The understanding was only come to ten or fifteen days ago in Paris. We have not yet got all the forms legalized, but we believe they will be in a few days. As I say, the arrangement itself is made, and will, no doubt, be carried out in all its integrity. We feel, therefore, quite safe in treating the accounts accordingly. The dividend proposed on this occasion is at the rate of 5 per cent. for the half year—not, certainly, a very large dividend, but larger than that of some other companies which have been affected more than we have been by the price of coal, and certainly larger than some who have not been able to pay any dividend at all, not from any fault on the part of their managers, but from circumstances entirely beyond their control. And you must bear in mind that we cannot be responsible for such things as the extraordinary price of coal; when they come we must meet them as we best can. It is quite beyond our power to get coals cheaper than the market price of the day, unless we happen to have contracts running, as we had at the beginning of last year. There is one thing in this company which prevents us doing as others do, and that is, we cannot raise the price of our gas. This has been already explained to you, and therefore what profit we get must be got out of the price of gas as it stands; whereas, in some other companies, there is power to raise the price when necessary, and thus they can keep up the dividends of their shareholders. But I think we have seen the worst, and that we shall find ample compensation in the future for the disappointments of the past. Nothing else occurs to me at the present moment as being necessary to bring before you, but, if there be any other information desired, I shall be happy to give it. I now move—"That the report and accounts be received and adopted."

Mr. BLAKE seconded the motion.

Mr. JENKINS: What is the ordinary average price of coal?

The CHAIRMAN: About 45 francs per ton.

A SHAREHOLDER: It is very difficult to appreciate the details of a report which is only brought before us at these meetings *viva voce*. I should like to ask whether there is any substantial reason why the report should not be printed and circulated among the shareholders a few days prior to the meeting. I am quite aware that there may be circumstances which would make reticence necessary on the part of the directors, but, from what I could gather as the report was read, there was nothing of the kind in reference to our affairs on this occasion.

Mr. TENDRON: The speech of the chairman was so exhaustive, and he entered so fully into the matter of the *Union des Gaz*, that I dare say the bulk of the shareholders understand that it is an arrangement very advantageous to this company. It is so not only for the reasons stated by the chairman, but for a reason to which he did not refer. I mean with reference to the large expenditure which this company took over from the *Société d'Exploitation* for plant. This was a very large figure which had to be extinguished during the concession, in addition to a sum of £128,000 which have been paid by the company up to the present time in extinguishing bonds. Although the revenue of the next 40 years will have to bear this charge, I contend that the condition of the company is better than ever. The money received from the bonds has been expended on the works, and it might be argued that, being a capital expenditure, it was a fair charge on capital. Had the arrangement continued with the *Union des Gaz*, we were bound to *amortize* in addition a large sum which we now take upon ourselves, and on which we shall only have to bear our portion of the interest; in other words, as they hold one-fifth, and we four-fifths, they will bear one-fifth of this charge as a partial return for any excess of dividend beyond 7 per cent. I wish the chairman, in replying to any remarks made by the shareholders, would give us some little information about the terms of our concessions. For my own part, I think there is a fair reason to expect that, when they do expire, we may get renewals of them, and that our property will not then be of less value than it is at the present time. With regard to the question of leakage in this year of adversity, I have been much struck with the importance of this subject, and I was glad to hear the chairman, in his speech, explain that steps would have been taken sooner to remedy this large leakage had there been more unification of interests between the two societies. I have no doubt that it will now receive the earnest attention of the directors, for I have no doubt in my own mind that a dividend is to be paid out of the saving in leakage. I congratulate the chairman and directors on the steps they have taken. Not only do we as a company hold four-fifths of the interest in the *Union des Gaz*, but many of the shareholders have individual interests in the concern. It is really now in the hands of the English company, and will be managed by us. Such being the case, I throw out a suggestion for the consideration of the board. There have been great scruples about the publication of the reports of this company, and I would not say anything in favour of publishing our balance-sheet, but I think the balance-sheet of the *Union des Gaz* should be translated, and the figures converted into English currency, and laid on the table for the inspection of our shareholders. I think we are fairly entitled to know how that company are progressing, and what are their receipts and expenditure. I do not think there can be any objection to it. At all events, I throw out the suggestion for the consideration of the board.

The CHAIRMAN: With regard to the circulation of the report before the meeting, I think I explained that we called the meeting as soon as we could after the arrangements had been entered into at Paris, and therefore, if for no other reason, it was quite impossible to circulate the report previously. We have lately sent round to our shareholders a printed copy, not only of the reports of the directors, but of the proceedings of the general meetings, and you will receive the same on this occasion. Mr. Tendron is quite right in stating the great advantage we derive from the new arrangement, and therefore I need not go further into that. The amortization of the bonds is only one feature of it. With regard to the terms of our concessions, it would not afford much information if I were to tell you the number of years which each has to run. We have some for short terms, but the principal matter is that all our large towns are secured by long terms, and in one of the most important we have still 50 years to run. A sinking-fund, therefore, of one-half per cent. on the capital there would redeem the whole; but then we do not give up our property after 50 years. With regard to leakage, I will give you the figures, for it is quite erroneous to suppose that we wish to conceal anything. The only reason why we sometimes appear to be reticent is that we have conflicting interests in different towns, and, as I said in my remarks just now, municipalities are always ready to take advantage of gas companies especially. There are gentlemen present connected with other companies who know how truly this is the case. We therefore do not always think it advisable to publish everything. But I may say at once that if any shareholder wishes for information respecting the affairs of the company, and will make an appointment with me, I will meet him at the office and go through everything, and I guarantee that I will satisfy him. Our leakage last year was 19 per cent. It is high, certainly, and we hope to do a great deal in the way of reducing it. We state in the report some of the means we are taking, or intend to take. At Nismes and Rueil we intend to replace faulty mains, and at Genoa we are about to lay down a main of larger capacity, so as to reduce the pressure, and thus bring down the leakage. I have no doubt we shall derive benefit from the steps we are taking. Mr. Tendron has thrown out a suggestion that we should publish the balance-sheet of the *Union des Gaz*. It is the custom of that society to print their balance-sheet and report after the meeting. I do not think there would be any objection to translate it, and lay it on the table here for the information of our shareholders; but, of course, we have our three colleagues in Paris to consult, and we could not pledge ourselves or them, or the *Union des Gaz*, to take this step without their consent. I can see that

there might be some little objection in so far as it might affect the renewal of concessions; but, in any case, I repeat what I have already said, that every shareholder can obtain any information desired at the office of the company.

The motion was then put and carried.

The CHAIRMAN moved the re-election of Mr. Fawcett as a director.

Mr. LEWIS seconded the motion, and it was carried.

Mr. BADDELEY moved the re-election of Mr. Hadland as an auditor.

Mr. BLANFORD seconded the motion, and it was carried.

Mr. WATERWORTH moved the re-election of Mr. Tendron as an auditor.

Mr. HERSEE seconded the motion, and it was carried.

Mr. STOKES moved a vote of thanks to the chairman and directors for their able management of the affairs of the company.

Mr. LIVESEY seconded the motion, and it was carried.

The CHAIRMAN, in acknowledging the vote, said: On my own part and on that of my colleagues, I beg to return our sincere thanks for the honour you have done us in passing this resolution. I assure you we have worked very hard in this matter; regarding it as a most serious one, we have brought our minds to bear upon it most earnestly, and I think we have done a good thing for the company in accomplishing it. You may depend upon it that our energies will be exerted to the utmost to carry it out, so that the shareholders may derive from it the greatest amount of benefit of which it is susceptible.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board, on Friday last—Colonel Sir J. HOGG, M.P., presiding,

Mr. ROCHE brought up a report from the Parliamentary Committee, which stated that the committee had had before them the notices of the various bills to be introduced by the board into Parliament next session, and had approved of the same, and given instructions for them to be advertised as required by the Standing Orders of Parliament. They had also given directions to the various officers to proceed with the plans, book of reference, &c.; and as the work of the officers might be, in consequence, more than usually arduous for a time, they recommended the board to authorize the solicitor, engineer, and architect to obtain such additional assistance as might be required to enable them to have everything ready. The plans, estimates, &c., referring to the new gas-works were being prepared by Mr. Stevenson, the gas engineer, under the authority of the Works and General Purposes Committee. The Parliamentary Committee thought it right to direct the attention of the board to the fact that Mr. Stevenson was preparing the plans and estimates under the direction of the Works and General Purposes Committee, as, although the Parliamentary Committee had nothing to do with that, it might be matter for consideration at their meeting on Monday next as to what should be done. He moved the doption of the report.

Mr. LESLIE: And I move, as an amendment, that the letter sent to this board from the Board of Trade be now read.

The CHAIRMAN: It is quite impossible to do so now.

Mr. RUNTZ: I submit that this is not an amendment to the motion.

The adoption of the report was put, and agreed to.

The CLERK submitted a letter from the Board of Trade, transmitting copy of a letter sent to the "Metropolitan Municipal Association," in reply to a deputation from that body, stating that the President of the Board of Trade cannot advise the Government to bring in a bill to compel the gas companies to amalgamate and reduce the price of gas, and that it is probable that the only final solution of the gas question is by the purchase of the companies property; also giving the views of the Board of Trade as to the deficiencies in the existing organization for the gas supply of the metropolis, and suggestions as to the conditions under which, in view of the probable purchase of the companies works on behalf of the consumers, any large scheme for the amalgamation of the companies would have to be made.

Mr. NEWTON: I move that this letter be referred to the Works and General Purposes Committee for examination and report. It is a most important communication, coming, with the authority that it does, from the President of the Board of Trade. There is much in it that one can approve; there are some things certainly that we cannot. I think, as far as my own district is concerned, the suggestion made, that in the future it should be supplied by the Chartered Company, would meet with the most strenuous opposition on our part. We should never consent to place ourselves in the hands of the Chartered Company. Our position would thus be made much worse than it is, and I am sure that the whole of the east end of London would rise against the proposition. But there are so many points to be considered in this letter that one cannot hastily come to a conclusion respecting it.

Mr. LESLIE: Print it.

Mr. NEWTON: It has been printed; it has been in all the newspapers, and it will be on our minutes. If it is referred to the Works Committee they will bring up such a report upon it that we can deal with.

Mr. LESLIE: Is a letter like this from the Board of Trade not to be read?

Mr. NEWTON: You have read it, no doubt.

Mr. LESLIE: Of course I have read it.

Mr. BEVEN: But surely we ought to have the letter read here.

The CHAIRMAN: It has already been in all the newspapers.

The amendment, "That the letter be read," was put, and negatived by 7 to 3.

Mr. LESLIE: I hope you will send this answer to the board, and say you did not like the letter, and so would not read it.

Mr. NEWTON: We do like it.

Mr. LESLIE: It does not look like it.

The motion to refer the letter to the Works and General Purposes Committee was then put, and carried.

DEPUTATION TO THE BOARD OF TRADE.

On Tuesday last a deputation on the subject of the supply of gas to the metropolis waited upon Sir C. Adderley, at the Board of Trade. The right honourable gentleman was accompanied by Mr. Bentinck and Mr. Farrer. The deputation was introduced by Mr. J. Beal, and included Mr. J. S. Storr, Mr. Mackillop, Mr. Tabor, Mr. Booth, and Mr. P. Phillips.

Mr. BEAL said that the object of the visit of the deputation was to invite the Board of Trade to aid what the gentlemen he represented felt was a wiser course of procedure than that suggested by the proposed action of the City Corporation and the Metropolitan Board of Works. After calling to mind some of the principal incidents in the past history of the gas supply of the metropolis, and stating that the total gain under the Metropolis Gas Act, 1860, had not been less than £600,000 per annum, Mr. Beal went on to say that if the policy now proposed by the City and Metropolitan Board were adopted, we should have competition again introduced, our streets would be torn up by competing factions, the companies underselling the board, or *vice versâ*—the whole burden, with whatever result, being borne by the consumer. He and those joined with him wished to pursue a policy recommended by the committees of the House, which had been steadily matured—viz., to enforce a policy of amalgamation, say to one company only, or to one company north and one south of the Thames, preparatory to purchase by the proposed new municipality, coupled with stipulations fixing the terms of amalgamation, so that the whole profit of amalgamation may not go to the companies, and increase the price of purchase. The scheme now proposed by the Metropolitan Board would have been the proper scheme in succession to the report of Mr. Cardwell's committee, but the terms of supply having been agreed to, and a policy of amalgamation with a future result entered upon, the scheme of competition was now, the deputation thought, an erroneous one, and would prove more costly to the consumer than one following the lines laid down. Important clauses providing for audit by the Board of Trade and inquiry into capital were incorporated, and these lines the deputation desired to extend to all existing companies. The result of inquiry as to the water companies in 1852 was to reduce their capital by £757,740. The deputation thought a similar result now attainable if the Board of Trade would pursue this policy. The time had now come to prepare a new order of things, and not to fall back on the old times of competition. In the absence of a municipality in London, the deputation asked Sir Charles to help them by introducing a bill to establish, as far as possible, uniformity of legislation in gas for London, accompanied with enforced amalgamation, so as to reduce cost of administration and ensure uniformity of price. The existing prices varied as follows:—Chartered Company, 5s.; Imperial, 4s. 8d.; South Metropolitan, 3s.; Commercial, 4s.; Independent, 3s. 6d.; London, 4s. 6d.; Phœnix, 4s. 6d.; Ratcliff, 3s. 9d.; and Surrey Consumers, 4s. 6d. The deputation felt sure that this might be remedied, and that it was within the province of the Board of Trade to confer this great boon on London in the absence of a municipality acting in their behalf to the like end. As an inducement to the Board of Trade to take the matter in hand, Mr. Beal mentioned that, by a return presented to Parliament in 1868, it appeared that the cost of parliamentary gas contests between 1857 and 1867 amounted to £104,900, all at the expense of the ratepayers, and that this sum of money had been swollen since by at least £30,000.

Mr. J. S. STORR urged the Board of Trade to take the matter up as a wing of the greater question—the creation of a metropolitan municipality.

Numerous questions were asked by Sir C. Adderley, Mr. Farrer, and Mr. Bentinck, and replied to by members of the deputation.

Sir C. ADDERLEY said he thought he had made himself fully acquainted with the subject, and assured the deputation that he would give to it his earliest attention.

The following reply to the deputation which on Tuesday waited on the President of the Board of Trade on this subject was, on the following day, sent to Mr. James Beal:—

Board of Trade (Railway Department), London, Nov. 11.

Sir,—With reference to your note of the 10th inst., and to the statements made by the deputation which waited on the president on the same day, I am to offer the following observations:—Your object appears to be to urge the Government to bring in a bill to compel the gas companies of London to amalgamate and to reduce the price of gas. The history of past legislation is not favourable to such an attempt, and Sir C. Adderley cannot advise the Government to undertake it. At the same time, there can be no doubt that the present condition of the gas supply in London calls for the serious consideration of those concerned in its management. It is obvious that the legislation of 1868 and of subsequent years has not produced satisfaction. The complaints of the consumers (whether well founded or not) have been numerous and incessant, and the present action of the municipal authorities in giving notice of competing schemes shows that the question will not be allowed to rest. It is probable that the only final solution of the long-pending disputes between the companies and the consumers is to be found in a fair purchase on the part of the latter of the works and property of the former, and if the time has not yet arrived at which such a purchase can be satisfactorily effected, it is well to look forward to such a step as one which is likely to be taken at no distant period. In the meantime it is impossible to maintain that the present organization of the companies is satisfactory, or that the metropolis is supplied with gas at the cheapest possible rate. The districting of 1860, proceeding as it did on the then existing state of things, was necessarily incomplete and faulty, and the amalgamations which have, under parliamentary pressure, since been effected have done little to remedy the evil. A glance at the map prepared by the companies, of which a copy is annexed, will do more than any words or figures to show the absurd extravagance of the present system. The districts possessed by the several companies are arranged on no plan, have no natural boundaries; the places of manufacture are over twenty in number, whereas with proper arrangements less than half that number would suffice; they are situate almost at random, without reference to the districts which they have to supply, and often at such a distance from those districts that mains have to be laid for miles through the districts of other companies, exposed to all the danger of waste, but without a single supply-pipe; while in one case gas has to be forced from a distance downhill to supply a low-lying district. Nor do matters appear to be improving. It is said that two companies, through whose districts the very large main of another company passes, are about to apply for increase of capital to create a new source of supply immediately above this very main. The needless expenditure of material and labour, and above all the waste of gas arising from these causes, must be very large; and if by amalgamation and harmonious arrangements, this waste could be prevented, there is every reason to believe that the annual expenditure of the companies might be much less and their incomes much larger than they now are. Under present circumstances, it rests with the companies themselves to propose such arrangements, and if they fail to make the attempt, they lay themselves open to the observation that, being secure of their 10 per cent. dividend, they have no interest in promoting economy. As has been already noticed, purchase by the municipality is an event which must be looked to as imminent, and it is not probable that any fresh arrangement which would have the effect of indefinitely increasing the capital and value of the property to be purchased, and the consideration to be paid for it, would receive the consent of Parliament. If, therefore, any large scheme of amalgamation were proposed, it would be prudent to fix at the same time the terms on which a future purchase might be effected. It would seem also desirable, if in the meantime fresh capital is required, that it should be raised by borrowing rather than by shares, so that, in case of purchase, the purchaser may have to pay no more than the actual capital expended, and so that in the meantime the consumer may have to pay interest on loans at 5 per cent., and not on share capital at 7 per cent. or upwards. But if those points are duly provided against, the consumers have no interest in preventing the companies from reaping a fair share of any increased revenue to be derived from amalgamation. What they require is better or cheaper gas, and if they can get this at the same time that the companies make a larger dividend than they now make, it will be better for all parties. Indeed, it is much to the interest of the consumer to allow the companies to share in the profit to be derived by economy, since without this those who manage the business have no motive for economy. For these reasons it would appear to deserve serious consideration whether, the terms of the ultimate purchase being first determined, the companies should not be allowed on complete amalgamation to increase their dividend beyond the present fixed limit in some fixed proportion to any reduction they may thus effect in the price of gas. The Board of Trade have thus frankly expressed the best opinion they are able to form on this important question, and they propose to send a copy of this correspondence to the companies as well as to the City Corporation and the Metropolitan Board of Works. They feel that so long as the practical management of the supply of gas is in the hands of the companies they must be parties to any efficient scheme of reform, and they are anxious that the companies—acting, if possible, in co-operation with the municipal authorities—should by themselves prepare for and anticipate a friendly and final solution of this long-pending dispute.—I am, sir, your obedient servant,

T. H. FARRER.

MARYLEBONE VESTRY.—At the meeting on Thursday last—Admiral Oliver, churchwarden, presiding—on a motion to order payment of £3127 to the Imperial Gas Company for public lighting, complaints were made as to the insufficiency of light supplied to the street-lamps, more especially during this year, since the price of the gas had increased, and explanations were demanded. Dr. Whitmore, Medical Officer of Health and Gas Examiner, said that one of the causes of insufficient light in the public lamps was the occasional formation of naphthaline in the gas-mains and pipes, which he believed the companies could not prevent, and that, in fact, they would willingly pay a handsome sum to any one who could tell them how to do so. With regard to the frequent complaints of bad and insufficient light in private houses, he stated that it was not attributable to any deficiency of illuminating power in the gas supplied to the parish, because by his daily testings he had found it must be at least 16 sperm candles, or two candles in excess of what the law required, but that he believed it was caused in many instances through large accumulations of dark red powder in the pipes, produced probably by corrosion in the fittings and from other causes, which necessarily lessened the diameter of the gas way, and that by blowing this powder out of the pipes the evil complained of would be remedied —that, in fact, he had frequently seen this done, and always with success. Mr. Sherriff said it was not only a question of bad light, but no lights at all. Lamps were entirely out in various parts of the parish at ten and eleven o'clock at night. Mr. Vesey knew of one lamp that had been out for six weeks. Mr. Edwards said it was the duty of the police to report nightly every lamp out. It was resolved that the vestry-clerk write to the Imperial Gas Company in reference to the bad supply of gas, and also that it henceforth be the duty of the beadles to visit the police stations in their respective districts daily, and furnish a return of the reports of the police as to the number and place of lights being out during the previous night.

METROPOLIS WATER SUPPLY.

Major Bolton's report on the supply of water to the metropolis during the month of October states that the condition of the river at Hampton, Molesey, and Sunbury, where the intake of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was generally good throughout the month. The highest flood state of the river at Hampton during the month was 6 inches above the (6 feet) summer level, and the lowest 6 inches below. At Ditton the state of the water in the river was good on two days, indifferent on 13, and bad on 16 days during the month, the bad water being attributable to the river Mole. The Chelsea Company is now the only one whose intake is below Hampton Court Bridge. The higest state of the flood water at this place was 1 foot 2 inches above, and the lowest 15 inches below summer level. The highest temperature of the water during the month was 61°, and the lowest 50°, whilst the highest temperature of the air at the same place was 64°, and the lowest 46°. These observations were made daily at nine a.m. The rainfall during the month was 4·93 inches.

SUPPLY OF WATER TO THE ZOOLOGICAL GARDENS.—On Wednesday last a discussion took place at the St. Pancras Vestry on the alleged pollution of the Regent's Canal by the refuse of the Zoological Gardens, and other causes. At a previous meeting of the vestry it was resolved to print two reports—one from the Medical Officer of Health, Dr. Stevenson; and another from Mr. W. B. Scott, the chief surveyor—upon which the Sanitary Committee had based a resolution stating that, inasmuch as the evidence showed there was no pollution of the Regent's Canal injurious to health, they recommended the vestry to take no action in the matter. The report of the medical officer, which is dated the 5th of August, stated that on the 31st of July he had inspected the particular spots of the canal complained of by Dr. Job Collins and other residents of Regent's Park. The water was turbid and unsightly, but he could detect no offensive exhalations even when the water was disturbed by barges, and the canal was being fished at the time. As regarded the Zoological Gardens, he learned that the gardens do not discharge their sewage proper into the canal. An enormous quantity of water is used in the gardens for bathing-tanks; this water is passed into catch-pits, where the solid matter subsides, and the clear water is then run into the canal, and has a very faint odour of the skin of the animals only. As there is no sewer along at least a portion of the Albert Road, it was advisable that the Works Department should report as to what houses discharged sewage into the canal. The report from the chief surveyor, dated the 5th of September, states that none of the houses but a stable belonging to 15, Albert Road, drains into the canal. There are 19 gullies in the Albert Road that discharge into the canal, 10 being under the jurisdiction of the vestry and 9 under that of Her Majesty's Commissioners of Works. A urinal and closet, lately erected in the Zoological Gardens, between the canal and Albert Road, drain into the canal by an overflow from a cesspool, as do, also, some water-closets and urinals in the Zoological Gardens proper; and a drain from a slaughter-house runs into a cesspool, into which ashes, &c., are thrown, through which the drainage filters before escaping into the canal. The main drain of the gardens, receiving from ponds, closets, and urinals, intercepted by cesspools, discharges into the canal nearly opposite Albert Terrace, where the new bridge has been constructed, and from this drain there is a continued outflow of drainage. The chief surveyor states that in the course of his investigation it transpired that the Zoological Society took from the West Middlesex Company 9 million gallons of water last year, and that during the same year the society's well supplied about 7 million gallons, so that some 16 million gallons were discharged into the canal, in addition to the rainfall on the surface of the gardens. During the same period more than a ton of sulphate of iron was used to precipitate solid matter in the tanks and ponds before the water was allowed to escape into the drains, the deposit being carted away. The report of the Sanitary Committee was adopted.

TESTIMONIAL TO MR. JOHN YOUNG.

On Saturday afternoon, Nov. 7, the clerks, *employés*, and a few other friends met at the works of the British Gaslight Company, Stoneferry, Hull, in order to present to Mr. John Young, the superintendent, a testimonial of the regard in which he is held by them, and on the occasion of his removal to take charge of the works of the Sheffield United Gas Company.

The testimonial comprised a tea and coffee service, salver, and cruet stand, and the illuminated address before mentioned. The articles of plate bore suitable inscriptions, and the address was in the following terms:—

We, the undersigned, on behalf of the officers and *employés* of the Hull station of the British Gaslight Company, Limited, having learnt with regret that your connexion with them as engineer to the above company is about to cease, take the present as a fitting opportunity of testifying their regard and esteem for you, and beg your acceptance of the accompanying service of plate, not for its intrinsic value, but as an earnest of their good wishes for your future happiness and welfare.

Hull, Nov. 7, 1874.

The presentation was made by Mr. COX, one of the clerks in the establishment, but previous to the formal ceremony,

Mr. R. LINGING, the sub-manager, briefly addressed the audience and spoke of the high esteem in which Mr. Young had been held during the two years and a half he had been engineer of the British Gas Company in Hull. On behalf of the subscribers to the testimonial, he expressed the hope that in whatever sphere Mr. Young might in future be placed, he would receive the reward of his merits.

The address, beautifully illuminated by Mr. H. C. Cammidge, of York, having been read by Mr. COX,

Mr. YOUNG returned thanks. He said that there were times in the experience of every man, when he felt himself utterly incompetent to rightly discharge the duties incumbent upon him. Having listened to the expressions of hearty regard embodied in the address, and having had presented to him the beautiful articles before him, he felt quite unable to adequately thank them or to express how much he felt their kindness. He felt it all the more because the testimonial could not have been subscribed for without some considerable sacrifice on their part. They had heard of late that the kindly feeling between employers and employed was fast dying out, but he was far from believing that the fault lay particularly with the men. No doubt they sometimes made demands which were unreasonable, and which the employers could not justly grant, but, where men were kindly treated and dealt with as intelligent and rational beings, and not as mere machines, the question of wages could in the great majority of instances be satisfactorily arranged. He was proud to say that during the two years and a half he had been amongst them he did not recollect hearing one disrespectful word addressed to him. In every case an amicable adjustment of wages had been made; that was not due to him, but to the directors, than whom they could not find in England employers more anxious that their *employés* should be satisfactorily dealt with. He concluded by expressing to Mr. Linging and the several heads of departments his thanks for the assistance they had rendered to him during his term of management.

Mr. JOHN HUDSON, contractor under the company, briefly reminded those present of the important works which Mr. Young had carried out, and of the kind manner in which he had demeaned himself to all his subordinates.

Mr. APPLETON, foreman tinner, also thanked Mr. Young very heartily for the handsome manner in which he had expressed himself towards the workmen.

Three cheers were given for Mr. and Mrs. Young, and the proceedings terminated so far as the presentation was concerned.

In the evening the subscribers to the testimonial and friends took tea together at the Albert Hall, and spent a very enjoyable time.

PRESENTATION TO MR. M. H. LOAM, OF NOTTINGHAM.

A committeee appointed by the *employés* of the Nottingham Water-Works Company waited upon Mr. Loam at his residence, on Friday evening last, and presented him with a very handsome Louis Quatorze timepiece, upon which was tastefully engraved the following inscription:—

PRESENTED
TO M. H. LOAM, ESQ., M.I.M.E., ETC.,
BY THE EMPLOYES OF THE
NOTTINGHAM WATER-WORKS COMPANY,
AS A TOKEN OF RESPECT.
OCT. 1, 1874.

Mr. LOAM, in reply to the committee, said: Gentlemen, your spontaneous act in thus presenting me with this beautiful timepiece has quite taken me by surprise. I feel this expression of your kindness more than words can express, and shall ever remember the kind friends who have presented me with this graceful testimonial. I beg to say you could not have done anything which would have been more grateful to my feelings, and so long as I live I shall ever feel proud of your noble gift, and often, when its musical chimes indicate the passing hours, I shall think of those with whom I have been so long associated. Gentlemen, I again beg to repeat my very best thanks, and wish each of my water-works friends long life, health, and prosperity.

The committee afterwards spent a most enjoyable evening with Mr. Loam and his family.

INSTITUTION OF CIVIL ENGINEERS.

At the First Ordinary Meeting of the session 1874-75, held on Tuesday evening, Nov. 10—Mr. THOS. E. HARRISON, president, in the chair—the paper read was on "The Nágpûr Water-Works; with observations on the Rainfall, the Flow from the Ground, and Evaporation at Nágpûr; and on the Fluctuation of Rainfall in India and in other places;" by Mr. Alex. R. Binnie, M. Inst. C.E.

The author described the position of Nágpûr, the geological formation of the district, and the former works of water supply. The population of the city was 84,000, and the annual rainfall was 40·73 inches, of which 37·52 inches fell in the monsoon months. The new works had been constructed on the basis of an old native tank at Ambajhari, 4 miles from the city. The present reservoir had a total capacity of 257¼ million cubic feet, with a water surface of 370 acres. It was fed by a catchment area of 4224 acres, and was calculated to afford a daily supply of 15 gallons per head, under all the circumstances of fluctuating rainfall and of years of extreme drought. The embankment of the reservoir was 1033 yards in length, and was formed on the site of the former one, through which a puddle trench has been sunk, and afterwards the bank was raised 17 feet 4 inches. Floods were discharged over a weir 200 feet long. The water for the city was drawn off through a straining tower in the reservoir, by a syphon which passed over the old embankment and below the newly raised portion. It was conveyed to the city in a cast-iron main, 13 inches in diameter, and was distributed through a length of 10,500 yards of smaller pipes. The water service was principally a public one. The cost of the works had been £40,000, being at the rate of 9s. 5d. per head, or £31,500 per million gallons of water supplied per day.

In 1872 the intensity of the rainfall at Nágpûr varied from a rate of half an inch up to 4·733 inches per hour; the heaviest fall recorded was 3·55 inches in 45 minutes. In an extreme case, 98 per cent. of the rainfall flowed off the drainage area in two hours and fifty minutes. The average yield of the drainage area was 38 per cent. per annum of the rainfall. The capacities of reservoirs to afford certain quantities of water at Nágpûr were stated in a table, from which it appeared that a supply for two years should always be the limiting capacity for safety. From one season's observation the author believed that the evaporation from the surface of the reservoir amounted to 4 feet, or about 1-5th inch per day, and that the quantity of water lost to the reservoir by evaporation during the dry months was 54 per cent.

From a study of the records of rainfall at Calcutta, Bombay, Madras, Nágpûr, Mauritius, Barbadoes, Adelaide, Hobart Town, Cape Town, New York, Rome, Greenwich, New Bedford, U.S., and Prague, the author deduced that the fluctuations were similar in kind, and that they only differed slightly in amount. He compared them under the following heads, the results being given in a table:—Per centages of the number of years whose fall was above or below the average; the average fall of all the years above and below the average; the average fall of the three driest consecutive years; the maximum and minimum fall, and the extreme range or difference between them; the proportionate number of periods of three consecutive years below the average per 100 years; the greatest number of consecutive years below the average; and the average fall of the greatest number of consecutive years below the average. The author did not advocate any strict rule to be applied in all cases, but pointed out certain broadly-marked features, which he considered generally applicable to India, as well as to other parts of the world. He also investigated the probability of the fluctuations of the rainfall being affected by the solar spot periods. The results were recorded in a series of table, the conclusion arrived at being that the suggested connexion could not be proved, and that even if it existed, the amount was too small to be of professional importance.

The discussion of the paper is fixed for this evening.

LIVERPOOL GAS SUPPLY.—At the annual meeting of the Liverpool Town Council, on the 9th inst., it was resolved, on the motion of Dr. Cross—"That a special committee be appointed to consider the advisability of acquiring the undertaking of the Liverpool Gaslight Company, and to report thereon and generally upon the whole question of the supply of gas to the public and the corporation, with power to employ such professional and other assistance as they may deem necessary." The committee, consisting of 15 members, was subsequently nominated.

WOLVERHAMPTON WATER SUPPLY.

At the Meeting of the Wolverhampton Town Council on Monday, Nov. 9, the Water-Works Committee presented the following report:—

The corporation having now had possession of the water-works for six years, your committee consider the present a fitting time to submit the following comparative statement of income and expenditure during that period:—

EXPENDITURE.

	1868.	1869.	1870.	1871.	1872.	1873.	
Repairs	£649 12 8	£711 16 7	£917 3 1	£994 3 0	£1,039 14 5	£997 10 7	
Engine expenses	1,114 18 9	1,308 18 7	1,417 11 7	1,334 2 3	1,455 14 3	1,324 1 5	
Coals	1,733 5 10	1,846 11 4	1,960 8 0	2,283 9 8	2,568 17 7	3,479 9 0	
Rates, taxes, and miscellaneous expenses	1,501 16 8	1,722 16 8	1,565 13 6	1,778 10 8	1,852 6 11	1,716 11 9	
Interest on loans, &c.	4,083 6 8	4,146 10 8	4,115 1 1	4,135 9 2	3,804 0 11	3,745 1 6	
Ditto preference shares	1,190 4 8	1,194 1 0	1,199 9 7	1,192 15 5	1,197 17 2	1,204 4 6	
Ditto ordinary shares	2,437 10 0	2,445 6 3	2,946 17 6	3,419 15 10	3,925 0 0	3,945 16 8	
	£12,710 15 3	£13,376 1 1	£14,121 17 4	£15,138 6 0	£15,843 11 3	£16,412 15 5	

INCOME.

Water	£12,942 18 2	£13,170 9 1	£13,919 15 0	£14,142 2 0	£14,758 7 8	£15,521 17 10	
Fittings	320 5 4	347 8 3	451 7 3	376 8 6	225 16 1	271 7 1	
	£13,263 3 6	£13,517 17 4	£14,371 2 3	£14,518 10 6	£14,984 3 9	£15,793 4 11	
Profit	£552 8 3	£141 16 3	£249 4 11	....	....	....	£943 9 5
Loss	....	....	....	619 15 6	859 7 6	£619 10 6	2,098 15 6

Net loss at the end of 1873 . . . . . £1,155 4 1

BOLTON CORPORATION WATER-WORKS.

At the last Meeting of the Town Council of Bolton for the municipal year just closed, Mr. Abbatt, in moving the confirmation of the minutes of the Water-Works Committee, gave some interesting particulars in relation to the water undertaking of the corporation.

He said the water-works were purchased in 1847. At that time the capital was £112,500. In 1857, ten years after, it had increased to £190,759; and in 1869, 22 years after, to £373,971, of which £140,000 was due to the new works at Entwisle and Wayoh. In June of the present year the capital account stood at £501,954 1s. 9d. He had tried to form an idea as to what might be the ultimate cost to complete the present undertaking. The committee had already resolved that high level mains should be laid, at a cost of over £20,000, and, he should like to say, it was very important that this should be done at once. Unless it was done, by-and-by, when they had obtained the water, they would not be able to deliver it, although they might have plenty of applications for water from various quarters. One important matter had been neglected, he feared, during the past year, and that was that during the extremely fine weather they had last summer nothing was done towards putting the valve-shaft into a proper position; and now since the fine weather had gone, and they were ready to impound the water, the engineer told him he was not aware of the fact that the valve-shaft was just in the position it was when they finished making the hole, and was simply supported by timbers. That work still remained to be done; and every now and again the workmen had to scramble out of the shaft or be drowned like rats in the hole. In addition to the £20,000 for the high-level mains, the pitching at Entwisle and the new byewash would cost, at all events, a ew thousand pounds, so that it would not be safe to estimate a less total cost for the water-works of the corporation than £550,000. Of that amount, up to the present time £46,522 was due to capitalized interest. Now, he thought it would be somewhat interesting to the council to know how the interest and charges upon £550,000 were to be met. He would call the attention of the council to the revenue and expenditure account from the commencement, and he thought they would admit that they had made very satisfactory progress. In 1849, the first complete year of the council holding the water-works, the expenditure was £7051, and the revenue £6780, leaving a loss of £271. The revenue did not show any surplus profit available for the borough fund for the first 10 years. In 1857 the expenditure was £9908, the revenue £10,120, and the sum of £122 was paid over to the borough fund. During that period of 10 years the average increase in the expenditure was £286, and the average increase in revenue £334 per annum. 1869 was the last year in which the accounts could be fairly compared, as changes were then introduced into the mode of keeping them, owing to the new works, which prevented close comparison. In 1869 the expenditure was £13,389, the revenue £18,014. The average increase in expenditure for 12 years was £290 per annum, and in revenue £658. In the period from 1857 to 1869 the sum of £9072 was paid over to the borough fund as surplus profit, being at the rate of about £700 a year. During the last five years there had been a large increase. In 1874 the expenditure reached £16,900, and the revenue £26,426. To compare with former years, £1837 should be deducted from the expenditure, as that sum had been expended on account of the new works. When that was done they got an average increase in cost of maintenance of £352, whilst the average increase in revenue was £1656 per annum. The amounts transferred to the borough fund had been for 12 years, up to 1869, £9072; for 1870, £3941; 1871, £4513; for 1872 (sinking fund being suspended) £8255; for 1873, £3740; and for 1874, £9513, or a total of £44,034, or one fourth of the cost of the town-hall, or, to put it another way, almost covering the capitalized interest of the new undertaking. The expenditure had been largely increased, owing to the large increase in rates, their assessments having been more than doubled. In 1869 the rates were £513, and in 1874 £1360, including property tax in both cases. It should be borne in mind, too, that during that time the sinking-fund had been suspended. The committee had expended a considerable amount in repairs and renewals, in order to save all charges against revenue when the sinking-fund should be recommenced. He wished it to be distinctly understood that out of the revenue a great many new mains of enlarged size had been laid down, and the property of the corporation put into a good state of repair, so that the mains with a great number of valves and other conveniences were never in a better state than at the present time. He was sure the council would be interested also to know something as to the future of the undertaking. The revenue in 1876 should reach at least £28,500, and the expenditure, for reasons he had already given, would not exceed £16,900. But, in addition, the interest on new works, hitherto capitalized, would have to be paid out of the revenue. The capitalized interest last year amounted to £8886. Then there was one-eightieth of the capital and mortgage loan to be repaid. That in 1874 reached £316,809. If they estimated the last two items at £14,100, they would have to provide for an expenditure of £31,000, and there might be a deficiency of £2500, or about 2d. in the pound on the rateable value of the borough. It did not, however, appear necessary to increase the borough rate on this account. The deficiency, if carried to a suspense fund, as was done when the water-works were first taken over, would soon be wiped out, unless something very unforeseen should hereafter occur, or there should be gross carelessness in the management. The average increase in revenue for the last five years had been £1650, and it might be fairly assumed that that amount would be increased by £1000 a year outside the present area, as soon as they were prepared to deliver water. The South Lancashire people asked for 200,000 gallons per diem as a minimum to commence with, which, at 6d. per 1000 gallons (the least they ought to get), would yield nearly £2000. In 1876, then, the revenue would probably reach £31,000, and the charges would be nearly met. In 1877 the previous deficiency should be wiped out, and in 1878 there was every reasonable prospect of a surplus in aid of the borough fund, which from that time forward would certainly be increased annually. As regarded Entwisle, disappointing as the progress made had been, they had this year reaped the first fruits of their purchase, and tided over a very critical period in the town's history, having already received from it about 200 million gallons, which, at 6d. per 1000, would realize £5000. They commenced receiving water on the 9th of May, and at the present time, so full was Entwisle reservoir that Bolton was for the time being supplied with sufficient to provide for the consumption of the whole district. He thought he might safely say that, so far as the chairman, committee, and manager were concerned, the affairs of the water-works had been satisfactorily conducted during the past year.

Alderman FERGUSON said he did not remember that Mr. Abbatt made any estimate for filter-beds. He thought it would be a great mistake if the Water-Works Committee lost sight of that. Filter-beds were essential, and would be costly; and therefore if they were constructed, an addition would have to be made to Mr. Abbatt's estimate. He thought, however, that Mr. Abbatt's statement was very, very satisfactory,

The MAYOR said the committee had the filter-beds under consideration. During the next year, although they might probably not be able to report a very great improvement in the financial condition of the water-works, he thought they would not have any occasion for complaint.

Mr. ABBATT, in reply to Alderman Ferguson, said there was still a margin of £20,000, which he had not put against anything, and that would probably pay for the filter-beds.

The proceedings were then confirmed.

BRIGHTON GASLIGHT AND COKE COMPANY.

An Extraordinary General Meeting of Shareholders was held at the Office, St. Swithin's Lane, London, on Thursday last—GEORGE WALNE, Esq., in the chair—to consider and determine as to the issue of further share capital in accordance with the powers conferred on the company by Act of Parliament.

The following report of the directors was presented:—

The full amount payable on the shares last issued having been called up, and the proceeds expended, for the most part in the extinguishment of debenture debt, it becomes necessary to provide further capital to meet the requirements of the company.

The directors therefore recommend an exercise of the powers given for that purpose by the companies Act of Parliament, and they will accordingly propose to the meeting resolutions empowering them to raise such additional capital by the creation of 1500 £20 shares, being the balance of capital authorized by the Act, such shares to be offered to the shareholders. The proportion will be one new share to every three shares held by the proprietors.

The following resolutions were unanimously adopted:—

"That additional capital be raised by the creation of 1500 new shares of £20 each, as authorized by the Brighton Gaslight Act, 1848, being the remainder of the capital authorised to be raised by the said Act."

"That the option of subscribing for the new shares be given to the shareholders holding shares in the present capital of the company, in the proportion of one new for every three existing shares; and if any shareholder shall fail to accept the share or shares allotted to him on or before Wednesday, the 16th of December next, he shall forfeit his right thereto."

"That a first call of £3 per share be made on such new shares, to be paid on or before Wednesday, the 29th of December next; and any shareholder who shall not have paid such call on or before the said 29th of December next, shall forfeit all shares allotted to him."

"That further calls on such new shares may be made by the directors, of such amount and at such times as they may think fit."

"That from the 25th day of December next, the amount called and paid up on such new shares shall bear dividend, payable half yearly, at the same rate as the existing shares."

"That all new shares not accepted by the shareholders, and all forfeited shares, shall be disposed of as the next ordinary general meeting of shareholders shall order; and if no such order be made, then as the directors shall think fit."

"That a copy of the foregoing resolutions be sent forthwith to each of the shareholders of the company."

"That the registry of shares of the company be closed on the 28th of November next, at one o'clock p.m., preparatory to the allotment of the new shares."

"That the best thanks of the meeting be given to the chairman for his able and courteous conduct in the chair."

SUCTION-PIPE FOR TAR-PUMP.—Herr Hahn, engineer of the gas-works Canstatt, writes as follows to the *Journal für Gasbeleuchtung*:—"It may interest, perhaps, some of your readers to know a contrivance which during two years trial has proved very successful here. When it is desirable to obtain pure ammoniacal liquor, the customary plan is to use a gutta-percha tube, with a float; but the tube soon gets destroyed by the tar and ammonia. Our contrivance is as follows:—The iron suction-pipe of the pump is made to dip into the lowest portion of the cistern, where two angle-pieces are attached, the one being firmly screwed into the angle, while the other is readily moveable. From this second angle-piece a straight pipe rises to the strainer, which is supported by a thin leaden air-box, soldered with pure lead, and attached to it by a thin chain. The size of this float naturally depends upon the weight of the pipe and the ease with which the pipe moves. Even when the cistern contains only 1½ foot of liquor, the pumped fluid is clear, and not contaminated with any of the light oil floating on the surface, as the strainer is always sufficiently immersed, while the tar, being of too heavy and tenacious a consistence, acts solely as a lubricator and stuffing medium."

AMERICAN WATER GAS RESEARCHES.

A Report by Professors WURTZ and SILLIMAN.

[From the *American Gaslight Journal*.]

(*Concluded from page* 641.)

V.

AMMONIA AND OTHER INCIDENTAL IMPURITIES IN THE HYDROCARBON GAS.

Ammonia was never present in the Fair Haven gas in quantity sufficient at any time to discolour turmeric paper.

A careful determination of ammonia, from the slow passage of nearly 100 cubic feet of the gas, extending over a period of four days, through an apparatus containing diluted sulphuric acid, with all the precautions needful for accuracy, gave, for 100 cubic feet of the gas, 0·521 grains of ammonia, or about one-tenth only of the quantity allowed by the English law.

In the New Haven city gas, made with the same coals—viz., Westmoreland, with about 6 per cent. of Albert, the amount of ammonia found in the same manner was 0·9297 grains for 100 cubic feet of gas. The latter gas not unfrequently discolours turmeric paper, and at such times it contains probably more ammonia than is here quoted.

The analysis of the ammoniacal liquors from the two modes of production offers some curious points for the attention of those interested in the purification of gas, and suggests important considerations touching the reactions which take place in the hydrocarbon process.

Two samples collected from the gas-works at about the same time gave the following figures:—

TABLE V.

Samples.	Specific Gravity.	Ammonia per Gallon.	Carb. Acid per Gallon.
New Haven gas liquor, March 13, 1869 ..	1·011 ..	619 grs. ..	356 grs.
Fair Haven gas liquor, March 10, 1869 ..	1·032 ..	1420 „ ..	2039 „

The remarkable character of these results is obvious, not merely in the far larger condensation of ammonia from the gas by the hydrocarbon process, but still more strikingly in the retention by the gas liquor of nearly six times as much carbonic acid in this as in the ordinary process. Hence the high degree of purity which we have invariably found the compound hydrocarbon gas to possess, apart from the accidental air contamination. That, notwithstanding the frequent investigations made heretofore by gas chemists into this subject, these facts should have been hitherto overlooked, is not the least extraordinary circumstance. Indeed, heretofore, the objection most strenuously urged against all forms of water gas, has been the supposed impossibility of purification from the contaminating carbonic acid. We find now, however, that by the process we have used, it actually, in great measure, purifies itself; insomuch that almost nothing is left to be accomplished by the purifying agents but the removal of the sulphur. Theoretical views, regarding the principles involved in this new discovery in gas purification, are held by us (such views having led, indeed, to the institution of the analyses cited above), and will be, in due time, brought before the chemical world. We shall, in addition, point only to the interesting reflection here prompted, that in the history of this improvement, as has not uncommonly occurred in the history of other human arts, an element which, in the earlier stages of progress, has constituted the greatest obstacle to practical success, is afterwards found to involve, when properly understood and controlled, one of the actual essentials to complete success. It is, without doubt, the presence of the larger amount of carbonic acid relatively to the ammonia, together, it may be, with the presence of a larger amount of steam in the condensing vapours, that leads to the greater deposition of the ammonia at this stage; the prevention of its passage on, in the form of sulphide of ammonium, to the purifiers; and the diminution thus of the work remaining to be done by the latter. It follows that the effete lime from the purifying-boxes, when the hydrocarbon process is employed, should be found much less charged with ammonia and sulphide of ammonium than ordinarily. In a qualitative way we have satisfied ourselves that this is actually the case, but are not yet prepared to offer numerical results, and defer, therefore, for the present, any further discussion on the subject; convinced that gas engineers will see, from what has already been stated, that there is here indicated a positive result of great practical importance in the art of gas purification.

We ought not to omit to mention, however, in this connexion, another fact which strongly confirms the views above expressed as to the almost complete removal of the ammonia by the action already explained. It is this—that the gas at Fair Haven was not washed or scrubbed at all. The use of the washer was discontinued entirely from the moment we obtained evidence of this important reaction in the stand-pipes and hydraulic main, and the gas went direct from the condensers to the purifying-boxes without contact with water.*

SULPHUR IN THE GAS.

The presence of sulphur compounds was never detected at any time during our experiments at Fair Haven, when tested for by the usual methods with lead paper. But by a slight modification of Dr. Letheby's form of combustion apparatus, conducting the examinations with all the usual precautions, the quantity of sulphur found in the Fair Haven gas did not exceed 4 grains to the 100 cubic feet of gas burned. The smallest quantity, determined on about 34 cubic feet of gas, was 1·691 grains of sulphur to the 100 cubic feet; and the largest quantity was 3·965 grains to the 100 cubic feet.

In the New Haven city gas, the quantity of sulphur on the 11th of February was 5·21 grains per 100 feet, the gas being from the same coals.

The English law allows 20 grains of sulphur to the 100 cubic feet.

BISULPHIDE OF CARBON.

This impurity, often spoken of as a contamination of coal gas, was in vain searched for in the hydrocarbon gas at Fair Haven. The method employed was that recommended by Bowditch, by passing the gas for a long time in a slow and regulated current through alcohol heated to 160° Fahr. It is extremely doubtful if carbonic disulphide can exist in gas well purified by hydrate of lime. We have never found it. The sulphur compounds in the gas which appear as sulphurous acid on combustion are undoubtedly sulphuretted bases, as yet but imperfectly known.

CARBONIC ACID IN THE GAS.

Daily testings for this often-occurring impurity in coal gas failed to detect a trace in the hydrocarbon gas at Fair Haven: except on a single occasion, when the purifiers were out of order. Even then the quantity was inconsiderable.

In view of the annoyance which was experienced in the English experiments on the hydrocarbon gas, from the constant presence of this impurity, and the disastrous effect it had in destroying the value of the light, we were very careful to avoid any possible error on this point. It appears to be almost entirely removed in connexion with the ammonia by this process, as already explained previously. This absence of carbonic acid from the purified hydrocarbon gas is not the least satisfactory of all our results in this research.

Acetylene.—Marked traces of this hydrocarbon were detected in the hydrocarbon gas at Fair Haven, on many occasions, but its presence cannot be regarded as of much practical importance.

ANALYTICAL INVESTIGATIONS.

In the present stage of progress of the art of making illuminating gas, no improvement, however highly esteemed by those familiar with it, could command serious and adequate attention from those who control this interest, without the production and presentation of proofs founded upon the most exact, complete, and consistent analytical results. Realizing this from the first, our most earnest efforts were devoted to the organization and perfection of a gas laboratory, and of apparatus and methods adapted to the complete analysis of the gaseous combinations with which we have had to deal. Chemists who know the innumerable difficulties that environ this most delicate and troublesome of all species of analysis will understand, to some extent, the obstacles encountered in the improvization of a laboratory adapted to this purpose; but these difficulties were, in practice, even much greater than we had imagined. It was even found impossible, in consequence of the entire novelty of the undertaking in this country, to procure, without great delay, the eudiometers and other apparatus requisite.* The calibration and testing of all our instruments, when procured, and the elaborate tabulation of these calibrations, and the computation of the coefficients for correction of each instrument, without which most of our results would have been chaotic, consumed necessarily much additional time. The peculiarities of the case even rendered necessary the invention of new apparatus, manipulations, and methods. These will soon constitute subjects of communication through other channels, and we shall, therefore, make in this report only such incidental allusions as cannot be avoided to these new and peculiar instruments and methods.

COMPOSITION OF THE GAS FROM THE ANTHRACITE RETORTS.

The samples analyzed were collected by attaching to apertures in the tops of the mouthpieces of the anthracite retorts an iron tube, bent at a right angle, and leading to an india-rubber bag furnished with a stop-cock. From the latter the samples were at once transferred to tubes over quicksilver. The following table exhibits results obtained at different times in the course of our work. (See Table VI.)

TABLE VI.

Composition of Gas.	(1.) Dec. 23, 1868.	2.) Dec. 24, 1868.	(3.) Dec. 29, 1868.	(4.) Dec. 30, 1868.	(5.) Feb. 11, 1869.	(6.) Feb. 24, 1869.	(7.) Feb. 26, 1869.	(8.) Feb. 27, 1869.
Hydrogen . .	..	Heats high.	..	..	48·82	48·96	Heats high.	Heats high.
Carbonic oxide .	..	..	..	..	28·63	30·66	..	..
Marsh gas . .	..	..	..	..	3·34	2·92	..	..
Nitrogen . . .	..	..	..	..	4·45	2·88	..	..
Air	..	..	..	..	Trace.	1·15	2·00	2·00
Carbonic acid .	11·26	6·74	..	..	13·08	13·03	3·20	3·27
Sulphrettd. hyd.	..	..	12·90	12·73	1·68	0·40	Trace.	Trace.
Totals . .	..	..	..	..	100·00	100·00	..	..

TABLE VII.

Gas.	No. 5.	Hydrogen Volumes.	Oxygen Volumes.	No. 6.	Hydrogen Volumes.	Oxygen Volumes.
Hydrogen	48·82	48·82	..	48·96	48·96	..
Carbonic oxide. . . .	28·63	..	14·32	30·66	..	15·33
Marsh gas	3·34	6·68	..	2·92	5·84	..
Nitrogen	4·45	..	..	2·88	..	..
Air	..	..	..	1·15	..	..
Carbonic acid	13·08	..	13·08	13·03	..	13·03
Sulphuretted hydrogen .	1·68	..	..	0·40	..	..
Totals	100·00	55·50	27·40	100·00	54·80	28·36

The complete analysis (5 and 6) in Table VII. are selected here, from many which were made, as being the latest in point of time, and, therefore, made with all our latest improvements in accuracy of manipulation. Their agreement with each other is close, and their accordance with theory is strict, as will be shown below. We present them again by themselves, with reductions into forms of greater chemical interest:—

Carbonic oxide represents half its volume of oxygen; carbonic acid its own volume of the same; while marsh gas contains double its volume of hydrogen. Theoretically, of course, the total oxygen volume should be half that of the hydrogen. The ratios of the half hydrogen to the oxygen volumes, as actually found above, are:—

	½ H.	O.
In No. 5	27·75	: 27·40
In No. 6	27·49	: 28·36

We should probably remark that, as the only conceivable source of nitrogen is interdiffusion through the walls of the retort with the gases of the fire space, in which latter there is little or no free oxygen, we do not allow in the calculation the volume of oxygen correspondent (as air) to this nitrogen; also that we have not calculated the hydrogen corresponding to the sulphydric acid, because in the formation of this gas from the sulphide of iron present, at least an equivalent quantity of oxygen must be consumed in oxydating the iron.

We present, also, in another table (VIII.), the above analyses, restricted to the three constituents which are of main interest in this connexion, excluding those which must be regarded as impurities:—

TABLE VIII.

	No. 5.	No. 6.	Mean.
Hydrogen	60·43 ..	59·32 ..	59·87
Carbonic oxide	35·44 ..	37·14 ..	36·29
Marsh gas	4·13 ..	3·54 ..	3·84
	100·00	100·00	100·00

Since the discoveries made of late years by the French chemist, Berthelot, regarding the synthetical production of marsh gas from its elements, its presence in these gaseous mixtures, as indicated by our analyses, will cause no special surprise. With regard to the presence of *nitrogen*, in such appreciable quantity, we would remark that this result of the analyses clearly indicates a future improvement in the process, in the rendering of the clay retorts impermeable to gas, which, it is believed, can be accomplished without difficulty.

COMPOSITION OF THE COMPOUND ILLUMINATING HYDROCARBON GAS.

Many analyses of this were made from time to time, of which we shall present

* It is important to add, respecting the subject of purification, that the purifying-boxes at Fair Haven were not in such condition as to enable us to obtain the maximum effect of the lime used, by any means. To purify 356,700 cubic feet of gas 100 bushels of lime were used, or 3567 cubic feet to one bushel. In the New Haven works, using the same coals, in all the year 1868, the amount of gas purified to one bushel of lime, was nearly 6000 cubic feet. At the Manhattan Gas-Works, in New York, the average is about 3800 feet per bushel, using chiefly "Westmoreland" or "Penn" coals for two-thirds, and Cow Bay (Blockhouse) one-third. But the latter is a very sulphurous ("dirty") coal, while the Westmoreland and Albert are remarkably clean of sulphur. Alone, the Westmoreland coal gives a gas of which one bushel of lime purifies 6240 cubic feet. Ample opportunities will soon offer to study this whole subject under greatly more favourable conditions than we have enjoyed, even in the very considerable scale of our operations at Fair Haven. The New Haven Gaslight Company having decided to adopt the hydrocarbon process in their works, we shall soon have such a number of benches of five retorts each at work, as will give the full solution of these and other equally important practical points. In view of the question of the adoption of this process of gas-making, the New Haven Gaslight Company had the operations at Fair Haven under the immediate direction of their intelligent and very successful manager, Mr. T. M. Cox, after the 1st of March; and the result recorded in Tables D and E, appended, are those obtained by Mr. Cox, upon the basis of which his company, by his advice, determined to transform their works at New Haven, and to adapt them to the Gwynne-Harris process.

* It is to be noted that this was written more than five years ago. Matters have improved in this respect within this period.—*Ed. A. G. J.*

here but four, being those last made, and made, moreover, at a time when the experimental retorts were working smoothly and uniformly, and nearly at the same time as the complete analyses of the anthracite gas above presented, so that they will be strictly comparable therewith. (See following tables.)

TABLE IX.

	No. 1. Feb. 5.	No. 2. Feb. 5.	No. 3. Feb. 8.	No. 4. Feb. 9.	Mean.
Hydrogen	43·61	41·85	40·69	42·22	42·59
Carbonic oxide	7·51	8·66	10·36	8·31	8·71
Marsh gas	33·55	34·16	33·74	32·26	33·43
Illuminants	6·45	6·47	6·21	6·23	6·34
Air	8·88	8·86	9·00	8·97	8·93
	100·00	100·00	100·00	100·00	100·00

TABLE X.

Containing the same Results as in Table IX. Reduced to 100 Parts, without the Contaminating Air.

	No. 1.	No. 2.	No. 3.	No. 4.	Mean.
Hydrogen	47·85	45·93	44·71	48·60	46·77
Carbonic oxide	8·24	9·52	11·38	9·15	9·56
Marsh gas	36·82	37·48	37 08	35·45	36·71
Illuminants	7·09	7·07	6·83	6·80	6·96
	100·00	100·00	100·00	100·00	100·00

At the time at which the samples were taken from the holder for analysis the coal being carbonized in the bituminous retorts was the Pennsylvania Westmoreland, with 10 per cent. of Albertite. At the same period gas was being constantly made to supply the neighbouring city of New Haven from the same mixture, with, however, but from 5 to 6 per cent. of Albertite, and, of course, without the water gas. The great interest and importance, for the sake of comparison and examination of the changes that occur, of obtaining an analysis of New Haven City gas was strongly recognized by us, and three attempts were made to transport samples to our laboratory at Fair Haven for this purpose. One of these, obtained on the 11th of February, was most fortunately successful, and the results are given below. Another analysis of a sample collected at a later date, February 25, unluckily failed, from some cause, to yield consistent or satisfactory figures.

COMPOSITION OF THE NEW HAVEN CITY GAS.

Sample collected Feb. 11, 1869.—Coals used Westmoreland, with about 6 per cent. of Albertite.

TABLE XI.

	Total Contents.	Without Air.	Without Air and Illuminants.
Hydrogen	42·47	43·58	46·79
Carbonic oxide	2·08	2·14	2·31
Marsh gas	46·10	47·42	50·90
Illuminants	6·67	6·86	—
Air	2·68	—	—
	100·00	100·00	100·00

Comparisons of an instructive character may now be made between the composition of the compound illuminating hydrocarbon gas (as made at Fair Haven under our supervision) and the composition of its component gases—namely, the Westmoreland gas (as enriched by a small per centage of Albertite) and the water gas, as proceeding from our anthracite retorts. In the first place, we may present a table in which the data are given for a precise examination into the consistency between the results of our analyses and our manufacturing results on the great scale, the latter being by far the most extensive ever yet attained in any operation of this class, while under exact scientific control. To effect this, we must necessarily throw out, in the case of each of the gaseous mixtures with which we have to deal, all constituents except those of a permanently gaseous nature; those which form the essential substratum of all illuminating gas—namely, hydrogen, marsh gas, and carbonic oxide. The illuminants must be thrown out of this consideration, as they are chiefly variable components, dependent upon the fluctuating solvent and sustaining power of the permanent gases, under the variable conditions that are incident.

TABLE XII.

	Mean of Anthracite Gas of Feb. 11 and 24.	New Haven City Gas of Feb. 11 (Westmoreland and Albertite).	Fair Haven Compound Hydrocarbon Gas. Mean of Feb. 4 to 10.	Calculated from Ratio of 1 of Anthracite Gas to 2 Newhaven City Gas.
Hydrogen	59·86	46·79	50·27	51·15
Carbonic oxide	36·30	2·31	10·27	13·64
Marsh gas	3·84	50·90	39·46	35·21
	100·00	100·00	100·00	100·00

Our computed figures in the fourth column of Table XII., designed to show the close correspondence between the analyses and the practical manufacturing results, are founded upon the actual numerical record of the make of gas in the two gas-works, which, for each pound of the mixture of bituminous coal carbonized, averaged during the month of February, for the New Haven works 4·15 cubic feet, and for the Fair Haven works 6·21 cubic feet of gas, being almost exactly 1 : 1·5, or 2 : 3.

When it is considered that the composition of the gas made at the New Haven works rests here but upon one isolated analysis, and, moreover, that the mixtures used in the bituminous retorts at Fair Haven and New Haven were not precisely identical, the former containing more Albertite, the approximation of the figures in the third and fourth columns of this table is close enough. If, instead of the mean of the four analyses of the Fair Haven hydrocarbon gas in Table IX., we compare specially the third analysis in that table with the calculated figures, we approximate still more to the latter, at least in the content of carbonic oxide.

TABLE XIII.

	1. Actual Analysis No. 3 of the Fair Haven Compound Gas.	2. Calculated from Half Anth. and Two-thirds New Haven Gas.	3. Col. 2 reduced to same Hyd. per centage as col. 1.
Hydrogen	47·99	51·15	47·99
Carbonic oxide	12 21	13·64	12·73
Marsh gas	39·80	35·21	33·03
	100·00	100·00	—

On examination and comparison of the first two columns of this table, it is apparent that the small discrepancy between the calculated and the analytical composition of the Fair Haven gas resides chiefly in the fact that the ratio of the marsh gas in the former is somewhat smallar. To show this more obviously, we have added the third column, in which the calculated per centages are reduced to the same proportion of hydrogen as in the analysis. Now when we consider that Albertite contains little or no oxygen, and can therefore yield little carbonic oxide, it is only necessary to suppose (what is extremely probable on theoretical grounds) that the permanent gas, or substratum of Albertite gas, is chiefly marsh gas, and the remaining discrepancy chiefly disappears, inasmuch as then the mixture which contains the most Albertite must yield the most marsh gas.*

CONSIDERATION OF THE ILLUMINANT CONSTITUENTS.

To these data, before entering upon their discussion, we shall add another short table, containing, with these, some further direct determinations of the illuminants in the Fair Haven gas, made at other times and under other conditions.

With regard to these results, the most striking general conclusion that forces itself upon our minds is, that no change is wrought in the solvent or sustaining capacity for the illuminant vapours of a special gaseous substratum (or mixture of permanent non-luminous combustible gases) by the substitution of one of its constituents for another. By Table XIV. it appears that the substratum of the Fair Haven gas contains 8 per cent. more carbonic oxide and 11½ per cent. less marsh gas than that of the New Haven gas; and yet about the same proportion of illuminating vapours is retained in the gas during its condensation in an uncondensable form of combination. Connected intimately with this part of the subject is the consideration of the quantity and quality of the tar condensed from the gas.

TABLE XIV.

	New Haven City Gas without Air. (From Table XI.)	Fair Haven Compound Gas without Air. Mean of 4 Analyses. (From Table X.)	Substratum of New Haven Gas without the Illuminants.	Substratum of Fair Haven Gas without the Illuminants.
Hydrogen	43·58	46·77	46·79	50·27
Carbonic oxide	2·14	9·56	2·31	10·27
Marsh gas	47·42	36·71	50·90	39·46
Illuminants	6·86	6·96	—	—
	100·00	100·00	100·00	100·00

TABLE XV.†

	Illuminants in 100 vols.	Coal and other Materials used.	Corrected Candle Power.	Remarks.
Dec. 17, 1868	7·20	Westmoreland, with 5 per cent. resin	20·03	
Dec. 31, 1868	6·42	Ditto	—	Weather had been very cold.
Jan. 6. 1869	7·67	Ditto	21·08	This gas had stood in the holder at rest for 8 days. Weather milder, and some of the illuminants condensed in Dec. had been again taken up.
Feb. 5, 1869	7·08	Westmoreland, with 10 per cent. Albertite	20·81	
Feb. 8, 1869	6·83	Ditto	21·05	
Feb. 9, 1869	6·80	Ditto	21·18	
Feb. 10, 1869	68·1	Ditto	20·86	
Averages	6·97	..	20·83	

THE GAS TAR OF THE HYDROCARBON PROCESS.

The total amount of tar condensed at Fair Haven between the 24th of February and the 27th of March was 270 measured gallons, and the quantity of coal (chiefly Westmoreland, with from 10 to 15 per cent. of Albertite) carbonized during the same time was closely 30½ tons, equal to about 9 gallons of tar per ton. The amount of gas produced during the same period was 409,000 cubic feet, or about 13,400 feet per ton.

At the New Haven Gas-Works similar mixtures of coals have yielded, during the same time, on an average, a little over 11 gallons of tar per ton of coal, the amount of gas produced being about 9200 feet per ton. It is clear, therefore, that the volume of gas that represents the difference in the product per ton of coal—namely, 4200 feet, must have taken up into solution not less than two gallons of the more volatile constituents of the tar. That this enormous amount of highly carbonaceous volatile oily matter is held fast by the compound gas with the greatest pertinacity is shown by our observations on the permanency of this gas under the influence of exposure to long-continued and intense cold, which are elsewhere detailed. It is incumbent on us to inquire what is the nature of the substances which are thus retained by the hydrocarbon gas. These must belong chiefly to what are classed as the heavy oils of coal tar, with the addition, doubtless, of naphthaline, a large constituent of that waste product. It appears, therefore, that the tendency of this improvement is to retain in permanent solution in the body of the gas a much larger proportion of those components of coal tar which are well recognized as having higher equivalents, higher vapour densities, higher illuminant intensities, and in every way higher practical values than the components now made available by the ordinary modes of manufacture. No consideration should more powerfully tend to overcome the prejudices that have unfortunately pervaded the minds of some gas engineers against the hydrocarbon process, than this.

The main components of coal tar, so far as known at present, that belong to the above class are—

Naphthaline	$C^{20}H^{8}$
Xylole	$C^{16}H^{10}$
Cumole	$C^{18}H^{12}$
Cymole	$C^{2}H^{14}$

Phenol and cresol are also present largely in the tar, but as these have been shown to be arrested, according to our previous investigations, by the ordinary lime purifiers, they do not fall under this head. The point that presents itself prominently here is, that an important per centage of the tar, including the above valuable illuminants, is shown incontrovertibly, by the facts here presented, to be made available by the application of this improvement. The substances here mentioned are recognized as those which make up the mass of the heavier oils distilled from coal tar, known as "dead oils."

THE VITIATION OF AIR BY BURNING GAS.

[A long chapter in the original report, on the calculation and comparison of the calorific powers of these gases, is omitted, because its substance has been long since incorporated with a communication by Professors Silliman and Würtz to the scientific world, which was published by us some four years ago.—*Ed. A. G. J.*]

The appreciation of the objections to the use of gas in close rooms has led long since to many attempts to introduce into use ventilated burners and similar contrivances, but these prove to be of no general practical value. The question as to the greater or less vitiation of the air of an apartment by different kinds of gas is, therefore, not without importance. It seems especially

* Dana's "Mineralogy," p. 753.

† This table is referred to on page 640 of the JOURNAL OF GAS LIGHTING.

desirable to examine into this point here, because among the popular accusations brought up often against hydrocarbon gas methods are, greater vitiation of air by carbonic acid, by reason of the supposed large per centage of carbonic oxide; inordinate amounts of watery vapour, from the combustion of so much hydrogen; and so on. All these, like many other notions that have prevailed, are shown by our analyses to be wholly chimerical—the difference in every case being in favour of the new process—as will appear from an inspection of Table XX.

TABLE XX.

		Cubic Feet Produced from 100 Cub. Ft. of New Haven Gas.	Cubic Feet Produced from 100 Cub. Ft. of Fair Haven Gas.
Watery vapour from the	Hydrogen	45·58	46·77
	Marsh gas	94·84	73·42
	Olefiant	13·72	13·92
Total watery vapour		152·14	134·11
Carbonic acid from the	Carbonic oxide	2·14	9·56
	Marsh gas	47·42	36·71
	Olefiant	13·72	13·92
Total carbonic acid		63·28	60·19
Oxygen consumed by the	Hydrogen	21·79	23·33
	Carbonic oxide	1·07	4·78
	Marsh gas	94·84	73·42
	Olefiant	20·58	20·88
Total oxygen consumed		138·18	122·46
Cubic feet of air corresponding		659·73	584·25

Densities.—Very numerous and careful determinations of density have been made by us, both on the water gas and the perfected hydrocarbon gas. We, however, attach very little importance to specific gravity as an index of the illuminating power of gas, and have therefore not introduced this element, except in a few cases; for example, in Table III. on another page in a preceding issue.

REVIEW OF THE PRINCIPAL POINTS ESTABLISHED BY THE PRECEDING RESEARCH.

The evidence set forth in this report sustains the following important conclusions, viz.:—

1. The production of illuminating gas by the Gwynne-Harris hydrocarbon process, on a large scale, and from materials in common use, is a result already well established.

2. The apparatus employed for this process is simple, inexpensive, permanent, little liable to derangement, and easily adapted, at a moderate expense, to all existing gas-works.

3. The average yield of gas obtained by this process from ordinary caking coals, with the addition of small per centages (5 to 15) of enriching coals, is 6½ cubic feet per pound, with an average illuminating power of 18 candles; and for a less candle power (say of 15 candles), 7 cubic feet per pound of coal is easily obtained.

4. The gas obtained by this process is remarkably easy of purification, uniform in quality, and very greatly superior to gas obtained by the old process in its ability to withstand low temperatures without sensible loss in illuminating power.

5. The cost of making gas by the hydrocarbon process is less than by the ordinary process, very nearly in proportion as the volume of gas obtained is greater. The value of this saving is distinctly set forth in Table II.

6. The analytical investigations herein given show that the average composition of the hydrocarbon gas varies much less from that of common street gas than has heretofore been assumed.

7. The heating power of the hydrocarbon gas is found to be greater than that of ordinary illuminating gas; while the water gas* is shown to possess a calorific intensity some 9 per cent. greater than that of a good sample of common illuminating gas.

8. The Gwynne-Harris method is peculiarly applicable to the economical use of very rich cannels or other enriching agents; thus yielding in a given apparatus the greatest possible volume of gas, of a given illuminating power, from a minimum weight of materials.

9. In entire variance with popular belief, our analyses prove that a compound hydrocarbon gas consumes much less atmospheric oxygen, and vitiates a given volume of air to a much less degree than an ordinary gas of equal illuminating power.

10. The correctness of the theoretical notions which lie at the foundation of the hydrocarbon process has long been recognized by the most eminent gas engineers; but it is believed that the solution of this important problem has been first successfully achieved by the American system herein described as the Gwynne-Harris process.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There is very little noticeable change in the iron trade, taking it at a whole. In some quarters increased dulness is being made a subject of complaint, but in one or two departments there is said to be a fair chance of having a pretty good winter's work. The foundries continue to be encouragingly engaged on the several classes of work which have been frequently mentioned in these columns of late, and therefore do not need to be again alluded to in detail. Foundry iron has a tendency to come down in price a little, owing to the dulness of the Cleveland and local iron-works. Agents now quote about the following figures for pig iron of general North Yorkshire makers brands:—No. 1 foundry, 71s.; No. 2 foundry, 68s.; No. 3 foundry, 65s. 6d.; No. 4 foundry, 61s. 6d.; No. 4 forge, grey, 58s. 6d.; No. 5 forge, mottled, 57s.; No. 6 forge, white, 55s. 6d.; refined metal, 79s.; Kentledge, 67s. 6d.; and cinder pig, 47s. 6d., all net cash, in railway waggons at the works. Sheffield and district forge iron is held at 68s. to 70s. per ton.

Castings have also a weaker tendency, in sympathy with the recent fall in pig iron, in consequence of the quietude of business and the greatly increased competition in this, as in almost every other, branch of the iron trade. Ordinary castings are to be had on much easier terms, and, in cases where special articles are needed, there is an evident desire to meet customers views as far as possible.

The coal trade is still very active, and would appear likely to become still more so now that we are being favoured with so keen a foretaste of wintry weather. The house coal branch is naturally busiest; but there is a good business doing in steam coal as well as in coal for shipment. The local railways are very much crowded with mineral and goods traffic, the press being worse than usual this autumn. Passenger trains are consequently running late, the block one day last week being so great as to result in a general delay of nearly a couple of hours. Following the previous almost general rise in prices, another leading local company has issued a new circular, advancing some kinds of coal 1s. per ton. The new prices in this case are these:—Picked coal, 16s.; best Birley Silkstone, 15s.; screened Silkstone nuts, 9s.; screened seconds coal, 11s.; coke breeze, 11s.; and unscreened slack coal, 5s. per ton.

* The term "water gas" is used here, and in general throughout this report, to designate specifically the mixture of hydrogen and carbonic oxide from the anthracite retorts; while the term "hydrocarbon gas" is applied to the perfected product of the hydrocarbon process.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The close of the shipping season has already had a marked effect on the demand for finished iron, and business in this department of the trade is now decidedly quiet. Merchants and consumers throughout the district are of opinion that prices will be again reduced before the close of the current quarter, and are consequently holding back their orders, and reducing their stocks to the lowest practicable limit; but the leading makers are combating the opinion, and freely assert that no further concession in prices can be made this year. Meanwhile the mills and forges are still in fairly steady operation, and prices for branded iron are comparatively firm on the basis of £10 10s. to £11 for bars, and sheets are quoted £12 10s. to £13, though there have been several transactions during the week below the minimum. On the other hand, makers of unmarked iron already show signs of weakness, and prices are very irregular, iron now being freely offered at from 5s. to 10s. per ton below the list quotations.

Pig iron is still in good request, and does not in any degree share the depression noticeable in the finished department of the trade; but this is probably due to the diminished output of the district. Messrs. Addenbrooke, Messrs. Ward, and Messrs. Onions, have each "blown in" one furnace during the past few days, and the make of pig iron in the South Staffordshire district is thereby increased to about 9000 tons per week, which is still considerably below the usual average produce. Prices are firm, at £5 to £5 5s. for all-mine hot-blast; grey forge, £4 10s. to £4 12s. 6d.; hematite, £4 2s. 6d; and cinder, £3 5s.

Coal is in improved demand, though prices are only maintained with difficulty. The colliers have acceded to the masters proposal to commence work at seven a.m. instead of six a.m., as noticed in last report, and the labour market is quite settled. In the Cannock Chase district the inquiries for best coal for household purposes are more numerous; but the common qualities of fuel are pressed for sale. Coke is in abundant supply, and prices are weaker.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The house coal trade in the Manchester district has continued excessively brisk during the past week, and there has been an increase rather than any falling off in the pressure for supplies. With, however, the resumption of the output in West Lancashire, it is not improbable, although list prices may remain without change, that the unusual activity in this branch may very shortly be followed by a sudden relapse, as it is only too evident that both private consumers and merchants have been taking in considerable stocks in anticipation of an advance in prices.

For good engine and furnace coal there is still an active demand, especially for deliveries from the collieries direct to merchants, which have been difficult to obtain. Good slack is also in demand, and prices all through are maintained, although the very high rates which have recently been demanded by dealers are not so easily obtainable.

In the gas coal and cannel trade there have been a number of small orders given out, and this would seem to indicate that the gas companies, anticipating that prices would probably be lower, have not, as a rule, entered into the usual contracts for their winter's supply during July and August. Prices, however, have been fully maintained since the summer, and there is a prospect of a continued steady demand to cover current requirements during the remainder of the winter. Quotations remain without any material alteration from those given last week.

As I anticipated in my last report, the strike in the West Lancashire districts is now at an end, the men having returned to their work at the 10 per cent. reduction, and the open market, which during the past few weeks has been considerably above the list rates, may now be expected to return to its old level; but as stocks of steam fuel are very low, and the large manufacturers and other consumers have not had an opportunity of taking in extra supplies, there is not much probability that any reduction in prices will be made until stocks are replaced, and therefore there is every prospect of the market continuing stiff during the next three or four months.

In the Liverpool market prices have been high, as there has been little offering from the Lancashire collieries; but, as soon as the usual West Lancashire supplies are resumed, an easier tone may be expected.

In the coke trade there has been a little show of animation, but there does not appear to be at present any really permanent improvement.

In the iron trade there has been a slight inclination on the part of Middlesborough makers, and also merchants in this district, to accept rather lower prices for next year's deliveries, but comparatively little business is being done beyond the present quarter. For early delivery, quotations for pig iron range about as under:—No. 1 Middlesborough, 78s. 6d.; No. 2, 76s.; No. 3, 73s. 6d.; No. 4 foundry, 69s. 6d.; and No. 4 forge, 66s. 3d. per ton; for delivery over a few months 1s. to 1s. 6d. per ton, and for the next six months about 2s. 6d. per ton less is taken. Manufactured iron has been a trifle easier. Ordinary bars have been quoted at from £9 2s. 6d. to £9 5s. per ton, delivered; heavy rails at about £8 2s. 6d.; and light ditto at from £8 17s. 6d. to £9, delivered in the Manchester district.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The wind was out of the North all last week, which prevented small sailing vessels getting down to the coal ports, and as they were scarce before, the market has been nearly clear of vessels; and freights for that class of tonnage advanced again 1s. per ton. The continued scarcity of small sailing ships in the Northern coal ports is likely to cause a good deal of inconvenience to coal merchants and gas-works on the east coast, and upon the British Channel, especially in those places which steamers cannot reach. Small vessels have been very difficult to procure for a month past. Steam tonnage is very abundant, and for every place where a steamer can discharge cargo they have been taken up. A quantity of gas coals were shipped in steamers in the Tyne dock, Pelaw Main, and the Felling last week. As before reported, a large amount of the best qualities of steam coals is contracted for until May next, and, therefore, they are not brought into the open market in any quantities. Second-class gas coals are firmer in price, but there has not been much advance upon previous rates. Household coals have become stronger in the market with appearance of the cold weather, and they will be ruled a good deal here during the next month by the state of trade upon the London Coal Exchange. A sensational paragraph appeared in the London papers last week, evidently written by a person very ill-informed upon the subject, stating that many pitmen at the Durham collieries were dissatisfied with the award made by Mr. Russell Gurney, Q.C., of a reduction of 9½ per cent. upon wages, and that there was likely to be a strike at the collieries. This is absolutely incorrect. The pitmen are perfectly satisfied with Mr. Gurney's award. It is the coalowners who think that Mr. Gurney conceded the men too liberal terms, but they will accept the award without any demur. The only ground for the report in question was that the men at bank were not included in this arrangement. They have got notice of

a reduction equal to the fall upon hewers and putter's wages, and negotiations are going on which, no doubt, will prove satisfactory. There is no apparent probability or possibility of a disturbance in trade arising out of the negotiations with the banksmen at the collieries. The steam coal trade was extremely dull last week, and there was a fall of fully 2s. upon prices. There was no inquiry for small steam or mixing coals, which were quoted at low rates.

In the iron trade last week, the inquiry for pig iron on 'Change at Middlesborough was better, and the prices were firm. But in rail-making great difficulty is experienced in meeting with contracts which would afford a profit. The finished iron trade upon the Tyne is very slack, and one large concern engaged in marine engine building has gone upon short time. Others are likely to follow.

The general manufacturing trade of the North of England is dull. There are few orders in the market, and none of them very profitable. The chemical trade was slack last week, and prices were weaker. In fact, speaking generally, few but old established houses are doing much business in any branch of trade, and middle men, who took contracts in the early part of the year, when prices were much higher, have great difficulty in carrying out their engagements, and some two or three new concerns have had to liquidate in bankruptcy.

Kettering Gas Company.—The yearly report of this company shows a deficiency on the revenue account of £556, attributable to the high price of coal and wages, leakage of boiler, &c. It is stated that the contract for coal has been obtained 25 per cent. lower this year than last, and reductions have been made in other matters, and it is expected the company's affairs will be much brighter in the year ensuing.

Gas Explosion on Shipboard.—About two o'clock on Monday morning, Nov. 9, while a number of men were unloading the *Lady Derby*, screw collier, in the Medway, at Rochester, a lighted candle fell into the hold, and, gas having accumulated there, a violent explosion ensued, injuring a number of the people employed in the hold. Four of the men were very much burnt about the head and face. They were conveyed to St. Bartholomew's Hospital, Rochester, and the condition of more than one is considered critical.

Romford Gas and Coke Company.—This company has just been registered with a capital of £17,000, in 3400 shares of £5 each. It was originally constructed under the Joint-Stock Registration Act, 1844, pursuant to which it was provisionally, on the 9th of January, 1847, and completely registered under deed of settlement on the 6th of April, 1847. It is now registered under the Act of 1862, in accordance with resolutions of a general meeting held at Romford.

The Sewage Difficulty at West Ham.—On Thursday last a deputation from the West Ham Local Board had an interview with the President of the Local Government Board (Mr. Solater-Booth) in reference to the disposal of their sewage. Mr. Meeson, the chairman, said that during the last two or three years they had spent about £8000 in experiments for clarifying and utilizing their sewage, but they had not succeeded, and they were now under penalties to both the Lea Conservancy and the Thames Conservancy. They had applied to the Metropolitan Board of Works in November, 1868, to be admitted into the drainage system of that body, but had been refused. The West Ham Board felt peculiarly aggrieved at this, because in 1872 the Hornsey Board had, by an Act of Parliament, been admitted into the system. After hearing Mr. Angell, the engineer, the president suggested that the application to the Metropolitan Board should be renewed, and that in the meantime a written statement should be submitted to the Local Government Board, who would do what they could to induce the former body to consider their case favourably.

Sanitary Condition of the Port of London.—The Port Sanitary Committee of the City Corporation have just received a report from the health officer, from which it appears that during the past month 1690 vessels have been inspected in the river and in the docks, and that in 270 cases orders were required and given for cleansing of berths, closets, forecastles, &c. The drinking water used afloat appears to be very bad, inasmuch as out of 15 samples examined, five were found totally unfit for drinking purposes, and six were reported as of dubious quality. In nearly all these cases, however, the water is said to have been obtained from foreign ports, most of the vessels frequenting the Thames being supplied from the tank boats of the Samaritan Company, which obtains its supply from the East London Water-Works. The six school-ships moored in this port are at present entirely free from scarlatina, special care having been taken as to the examination of new arrivals and in stopping leave.

Notes and Queries.

The Acid Test Query.—A propos of this subject, on which several letters have recently appeared in our columns, we observe that in Messrs. A. Wright and Co.'s price list the following distinction is made by Mr. Hartley:—

Test sulphuric acid . . . . . Specific gravity, 1063·5 per gallon.
Test sulphuric acid . . . . . " 1068 "

The first-mentioned acid is of the true strength, and consists of 1 lb. of pure sulphuric acid, specific gravity 1848, mixed with sufficient distilled water to measure one gallon at 60° Fahr. The second acid consists of 1 lb. pure sulphuric acid, specific gravity 1848, mixed with 9 lbs. of water.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

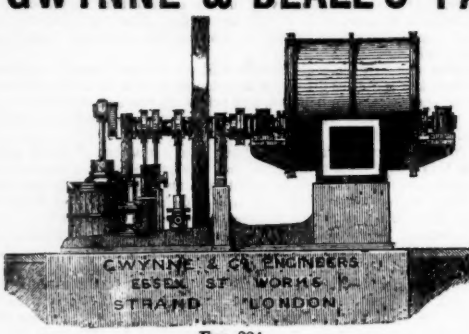


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.
Made under the personal superintendence of
Mr. BEALE,
The oldest Maker, Inventor and Patentee of
GAS-EXHAUSTING MACHINERY.
(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

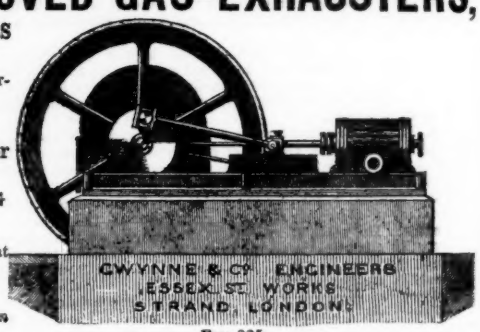
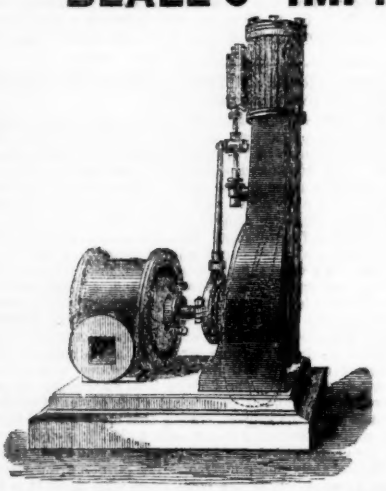


FIG. 225.

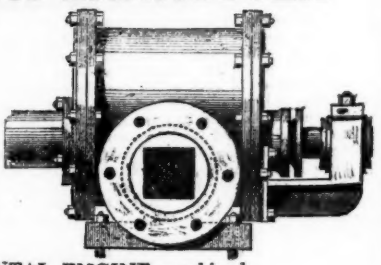
Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. Gwynne and Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO
GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.
G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

BEALE'S IMPROVED PATENT GAS-EXHAUSTER



WITH
ENGINE COMBINED
ON
ONE BASE PLATE.
SOLE MAKERS,
GEORGE WALLER & CO.,
Who, since Mr. BEALE'S retirement, are the Oldest Makers.



EXHAUSTERS with HORIZONTAL ENGINE combined.
EXHAUSTERS with OUTSIDE BEARINGS.
MAKERS of ENGINES, BOILERS, and GAS MACHINERY.
TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever.
MANN'S and many other descriptions of WATER DISTRIBUTORS.
SCRUBBERS, PURIFIERS, and CONDENSERS.
EXHAUSTERS from 3000 to 60,000, new and second hand, in stock.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, S.E., & at STROUD, GLOUCESTERSHIRE.

ULVERSTON GAS AND WATER WORKS.

WANTED, a Man as Meter Inspector and Main and Service Layer. Must be accustomed to gas and water fittings. Wages 35s. per week.

Applications, in own handwriting, stating age and present employment, and enclosing copies of testimonials, to be sent to the Manager, COLIN B. DARWIN.

WANTED, a Gas Engineer who can prepare estimates, and thoroughly understands every description of gas-fitting. He must also be a good draughtsman. One who has a connexion among architects preferred. State age, salary required, and last situation. None need apply unless fully competent.

Apply to Mr. C. DEFRIES, J. Defries and Sons, 147, HOUNDSDITCH.

WANTED immediately, by a provincial Gas Company, a respectable, steady young man as SECOND CLERK. He must be a perfect and quick accountant, good writer, and thoroughly understand the duties and routine of a Gas Office.

Apply, stating present salary and engagement, with all testimonials, to No. 103, care of Mr. King, 14, Bolt Court, FLEET STREET, E.C.

WANTED, for a Gas-Work in Lancashire, making about 7 million per annum, a WORKING MANAGER; one who can lay mains and services, do internal fittings, and take indices of meters, &c. A good house on the premises, with fuel and gas free.

Also wanted, Two good STOKERS. State wages required.

Apply, with testimonials, and stating salary required, to V., 4, St. Albans, LIVERPOOL.

WANTED, to purchase a 6-in. or 7-in. STATION-GOVERNOR, with or without valves and connexions. Also a STATION-METER, to pass 5000 cubic feet per hour.

Persons having either such to dispose of will reply, giving particulars and price, addressed to No. 105, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHAUSTER, &c., WANTED.

WANTED, an Exhauster, new or second-hand, with engine and boiler complete, by the Galway Gaslight Company, Galway. The boiler to be an egg-ended one, about 7 ft. by 3 ft. 6 in. The engine, with two pumps, to be fixed, and the exhauster to be of a capacity to pass 6000 feet per hour. Whoever is selected to supply the foregoing will be required to complete them in connexion with the Company's works at Galway.

Address Mr. J. TIERNEY, Secretary, Gaslight Company, GALWAY.

ADVANTAGES OF GAS FOR COOKING AND HEATING,

BY

MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas consumers.

Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

ON SALE—Two Scrubbers, each 7 ft. diameter and 14 ft. high; also one Washer, 8 ft. by 4 ft. by 4 ft. Removed to be replaced by larger ones.

Apply to RICHARD SAYER, Manager, Gas-Works, WIGAN.

FOR SALE—15 Round Retort Mouth-PIECES, 16 in. diameter with 6-in. sockets, new. Two Purifiers, 9 ft. by 5 ft. by 3 ft. 3 in., with lifting gear, &c., complete; 5 in. connexions. Condenser and Scrubber, box, 6 ft. 3 in. by 3 ft. 3 in. by 2 ft.; cylinder, 9 ft. by 1 ft. 9 in. Ready for use.

Address C. E., 3, Wyndham Street, Bryanston Square LONDON, W.

NOTICE.

WHEREAS, in pursuance of 11 & 12 Vict., cap. 63, NOTICE is hereby given that the Holywell Local Board are prepared to receive TENDERS for the LIGHTING of the PUBLIC LAMPS in Holywell, from the 27th day of November next to the 1st day of May, 1875, both inclusive. During five nights previous to each full moon the lighting will not be required.

Sealed tenders to be sent to the undersigned on or before the 23rd day of November inst.

The Board will not be bound to accept the lowest or any other tender.—By order of the Board.

WM. DAVIES, Clerk.

Local Board Offices, Holywell, Nov. 12, 1874.

Just published, 12mo., cloth, 5s.,

A COMPLETE EDITION OF THE

GENERAL GAS AND WATER ACTS, 1847—1873, with Explanatory Notes, Appendices, and full Index. Edited by JOSEPH RELSON, The Gaslight and Coke Company, Westminster.

To be had, post free, from the EDITOR; from W. B. KING, 11, Bolt Court, Fleet Street, E.C.; or from the publishers, WATERLOW and SONS, WESTMINSTER.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000.

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

BAHIA GAS COMPANY, LIMITED.

NOTICE is hereby given that an EXTRAORDINARY GENERAL MEETING of the Company will be held at the Offices of the Company, No. 10, Coleman Street, London, on THURSDAY, the 26th day of November, 1874, for the purpose of confirming the Resolutions adopted at an Extraordinary General Meeting of the Company, held the 29th day of October, 1874, as follows:—

"1. "That clause 21 of the Articles of Association of the Company be rescinded, and in lieu thereof the following shall constitute Article 21—viz., 'General Meetings of the Company shall be held in the months of May and November in every year, at such time and place as the Directors may appoint for all purposes within the provisions of these Articles of Association.'"

2. "That clause 28 of the Articles of Association of the Company be rescinded, and in lieu thereof there be inserted —'No business shall be transacted at any General Meeting, except the declaration of a Dividend, unless a quorum is present at the time when the meeting proceeds to business, and such quorum shall be the number of 13 members.'"

And Notice is also hereby given, that the Ordinary General Meeting of this Company (adjourned from the 29th day of October ult.), will be held immediately after the conclusion of the business of the aforesaid Extraordinary Meeting, to receive the Report of the Directors, the Balance-Sheet approved by the Auditors, and for general purposes.

The chair will be taken at Three o'clock precisely.

By order of the Board,

ALFRED J. HEAD, Secretary.

10, Coleman Street, London, Nov. 12, 1874.

A. C. FRASER, of 16, St. Swithin's Lane, E.C., who for 20 years has been engaged in the construction and management of works, may be consulted at the above address on all matters relating to Gas and Water Supply.

Plans, specifications, and estimates furnished. Patent Ribbed Retorts, Fire Goods, and Fittings of every description on moderate terms.

Mr. NORWOOD EARLE,

GAS SURVEYOR,

12, QUEEN VICTORIA STREET, E.C.,

Advises on all matters connected with the Distribution of Gas, Public Lighting, Gas Testing, &c.

Valuations made for Assessment and other Purposes.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

WM. RICHARDS,

INVENTOR OF THE DRY GAS-METER,

REVISER OF "HUGHES ON GAS-WORKS,"

CONSULTING GAS ENGINEER,

Advises on all matters of business connected with Gas Lighting. Furnishes Working Drawings of Retort-Settings, Specification of Works, complete or in detail.

17, BURTON ROAD, BRIXTON, LONDON, S.W.

GAS COMPANIES ACCOUNTS.

EDWARD SANDELL,

PUBLIC ACCOUNTANT,

The Projector of the Gas Companies Analyzed Expenditure Account Book, having had twenty years experience in opening, keeping, auditing, and investigating Gas Companies Accounts, offers his services for similar purposes, and also in preparing Financial and Statistical Accounts for Arbitrations or Parliamentary Applications. References to numerous Gas Companies and the most eminent Consulting Gas Engineers.

4, Skinner's Place, Queen Victoria Street, LONDON.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields. W. J. WARNER.

THOMAS ALLAN & SONS, of Spring-bank Iron-Works, Glasgow, manufacture small cast-iron GAS AND WATER PIPES, ½ to 6 inches, at their branch works, Stockton-on-Tees, and have at present a large stock, which they are open to sell at moderate prices

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET,

DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

ECONOMY IN CONSUMPTION OF GAS.

WIGHAM'S IMPROVED GAS-BURNERS, an adaptation of Wigham's Patent Lighthouse Gas-Burner, which has had the sanction and approval of the Board of Trade.

These Burners give the utmost possible amount of light with the smallest possible consumption of gas, totally avoiding smoke and noise in burning. Price 6d. each.

J. EDMUNDSON AND CO., Gas Engineers, 19, Great George Street, Westminster, LONDON, S.W.

Single Burners sent post free as samples on receipt of six penny stamps.

A liberal discount allowed to the trade.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20 & 22, WHARF ROAD

CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

HARRIS AND PEARSON,

STOURBRIDGE,

Proprietors of

BEST GLASS-HOUSE POT AND CRUCIBLE CLAY.

Manufacturers of

FIRE-BRICKS, GAS-RETORTS, & FIRE-CLAY GOODS of every description.

Orders of any magnitude, for home and exportation, executed with all possible despatch.

N.B.—A quantity of Retorts in stock. Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in. D's, 15 in. by 13 in.; 16 in. by 12 in.; 18 in. by 14 in. 20 in. by 16 in.; 21 in. by 14 in.; and 24 in. by 14 in.

BRAY'S PATENT ENAMEL REGULATORS.

We submit the above Burners to Managers of Gas Companies as being worth a recommendation to their consumers. Though the price is little more than that of common Burners, we believe them to be nearer perfection, for general use, than any others, however costly.

By many important gas and railway companies they are used as being the best obtainable for general purposes, and have supplanted enormously costly burners, which have been made to give good results in the testing-room, but which fail of their effect when brought to the test of general use.

Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner to the City of Glasgow, in a lecture on the "Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow in March last, says: "These are the best Burners obtainable at moderate cost," and, after mentioning several other "good" Burners, which ranged in price up to thirty times the price of ours, he continues, "but these are all costly, and their performance is no better than that of Bray's Burners."

GEORGE BRAY AND CO., BLACKMAN LANE, LEEDS.

PLUTONIC CEMENT,

For REPAIRING RETORTS while in ACTION, &c.

SOLE MANUFACTURER,

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J. & H. ROBUS,

(Late of the Crystal Palace District Gas-Works, Sydenham, and the New City Gas-Works, Montreal, Canada,)

GENERAL CONTRACTORS & RETORT-SETTERS,

FITTERS & MAIN-LAYERS.

RETORTS SET ON THE LATEST IMPROVED PLAN.

Retort-Setters sent to all parts of Europe and America.

Address, J. and H. ROBUS,

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PRICE'S PATENT COKE & COAL BARROW.

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

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THE HURST
FIRE CLAY and BRICK WORKS,
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Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
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GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, & TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

B. CARPENTER,
THE ORIGINAL MANUFACTURER OF
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.
WORKS:
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

TO GAS COMPANIES, ENGINEERS, &c.
WOOD SIEVES.—WOOD SIEVES.
Estimates given and Contracts taken by the Manufacturer
GEORGE MACKANESS,
36, EDWARD STREET, HAMPSTEAD ROAD,
LONDON, N.W.
These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.
N.B.—Specimens sent free on application.

WALTER MABON & CO.,
Engineers,
ARDWICK IRON-WORKS,
FAIRFIELD STREET, MANCHESTER,
MANUFACTURERS OF
IRON TANKS, GASHOLDERS,
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
WROUGHT AND CAST IRON GIRDERS.
DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

GAS AND WATER PIPES.
WILLIAM MACLEOD & CO.,
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS.
DELIVERY F.O.B. ON CLYDE.
Lists on application.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

EASTWOOD & CO.,
LIMITED,
Wellington Wharf, Belvedere Road, Lambeth,
AND
Canal Bridge Wharves, Old Kent Road, S.E.
LIME, CEMENT, AND BRICK MANUFACTURERS
AND MERCHANTS.
SHOEBURY AND KENT STOCKS, AND SUFFOLK RED AND WHITE BRICKS DELIVERED IN ANY QUANTITIES, OR BY BARGE ALONGSIDE.

Stourbridge, Newcastle, and Welsh FIRE-BRICKS and LUMPS of all descriptions.

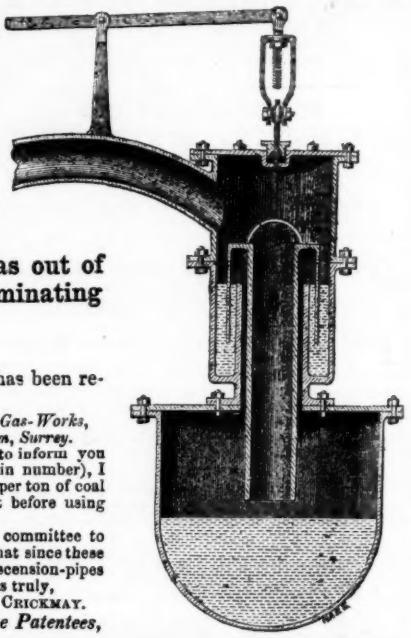
Malam and Moulded Bricks, PORTLAND CEMENT (made from the Medway Earth, &c.) of UNSURPASSED quality.

Grey Stone Lime, FLARE LIME Chalk Lime, Blue Lias, Roman and other Cements.

ALSO
BUILDING GOODS OF ALL DESCRIPTIONS.

CHANDLER'S PATENT DIP-PIPE

The advantages are—
1st, There is no pressure on the Retorts.
2nd, No deposit of Carbon.
3rd, No scurfing required.
4th, Never a choked Ascension Pipe.
5th, Saves Fuel and Wear and Tear.
6th, Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7th, Is never out of order.



The following (among other letters) has been received:—

Engineer's Office, Metropolitan District Asylum Gas-Works, Caterham, Surrey.
Messrs. Chandler and Sons.

Dear Sirs,—In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

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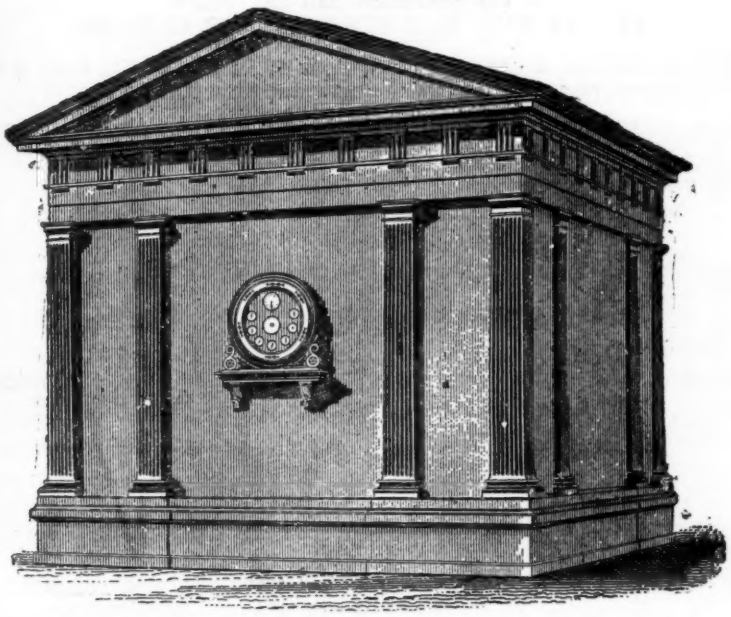

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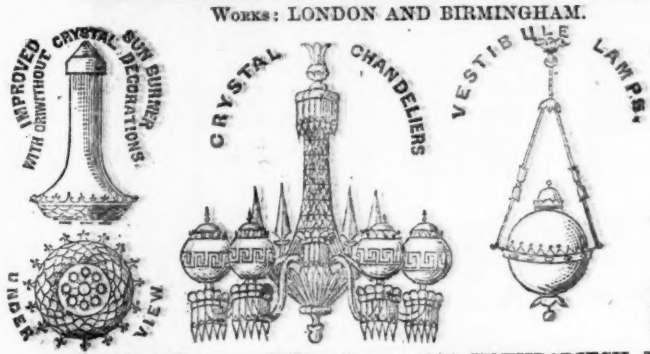

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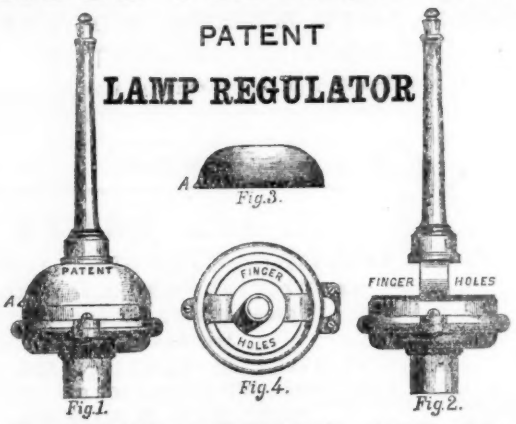

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Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—
"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."
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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·9	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

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